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CONTENTS.

EDITORIALS:
The Wisconsin Convention..... 163
Wireless for Safety at Sea..... 164
The President and the Trusts..... 164
Co-operation in the Telephone Industry..... 165

DEPARTMENTS:
Commercial Practice..... 175
Electric Sign Data..... 177
Electrical Construction..... 178
National Association of Electrical Inspectors..... 183
Public Service Commissions..... 186
Questions and Answers..... 188
New Electrical and Mechanical Appliances..... 200
Current Electrical News..... 203
Record of Electrical Patents..... 209

LEADING ARTICLES:
Electricity in Potteries..... 169
Central-Station Power for a Washing-Machine Factory.—By F. S. Dewey..... 175
The Relation of the Consulting Engineer to the Contractor.—By F. A. Vaughn..... 178
Midwinter Meeting of Illinois Contractors..... 179
Wisconsin Electrical Association..... 190

MISCELLANEOUS:
Buffalo Electric Show..... 166
Sea Safety Meeting Defines Wireless Equipment Status... 166
B. J. Arnold to Talk to Chicago Electrical Engineers on Subways and Railroad Terminals..... 166
Chicago Electric Club Meeting..... 166
Baltimore Section Discusses Electrification..... 166
Changes in Electrical Testing Laboratories..... 166
Electrical Exports for November..... 166
Conference of the American Electric Railway Association 166
W. D. Ray..... 167
Colonel Bailey to Address Vehicle Association..... 167
New England Vehicle Meeting..... 168
Chicago Jovians Discuss Electric Starters..... 168
Public Safety Discussed at Chicago Electric Vehicle Meeting..... 168
Telephone Employees Meet at Pittsburgh..... 168
Electric Sign in Warren..... 176
Conduit and Wire Charts..... 179
City Electrician Wanted..... 182
Detroit Inspectors Elect Officers..... 185
New York State Electrical Contractors Meet..... 185
Elihu Thomson Lectures on Wireless..... 187
National Electric Light Association Convention..... 187
National Independent Telephone Association..... 196
Western Red Cedar Association Meeting..... 198
Bailey Roadster Exhibited in New York..... 199

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THE WISCONSIN CONVENTION.

On other pages of this issue we make rather extended mention of the successful convention which was held by the Wisconsin Electrical Association last week in Milwaukee. Not only was the registration in excess of any previous gathering of this organization, but the papers and discussions were of exceptional interest; in fact, there are two features of the technical program which alone would characterize the convention as the most successful yet held.

The paper by Hon. Halford Erickson, member of the Wisconsin Railroad Commission, entitled, "Some Problems of Public-Utility Accounting and Rate-Making," will without doubt be considered as one of the most comprehensive and valuable contributions to the voluminous literature already available on this subject. The complete paper will be published in a later issue.

The paper by Mr. S. E. Doane, chief engineer of the National Electric Lamp Association, on "High-Efficiency Incandescent Lamps and Their Central-Station Applications," was also particularly interesting, as it touched upon one of the vital present-day problems in central-station operation. It is pointed out that the field of the incandescent lamp is greatly extended by the advent of these high-efficiency lamps and further development in this direction can be expected. The prelude of this paper which comprises a résumé of Mr. Doane's observations of central-station conditions in Europe, is both interesting and important in that it shows the extreme measures which the foreign utilities are adopting to secure small customers and the excellent results which they are obtaining in this respect. Much of the work which is being carried on in Europe to secure the small customer could well be emulated by central stations in this country. The basic principles upon which the success of the foreign utilities is founded are flat rates with current-limiting devices; close co-operation with electrical contractors; and elimination of much of the red tape of billing, collecting, etc., which in this country makes it impossible to secure the very small customer.

Another of the important papers at the convention was that by Mr. C. M. Larson, chief engineer of the Railroad Commission, entitled, "Street-Railway Traffic Surveys in Relation to Railway Operation, Management and Regulation." This paper explained very clearly how the Commission undertakes the survey of a transportation system, pointing out

that large savings can be effected in construction and operating costs by the adoption of proper routings and schedules. A significant statement was made by Mr. Larson to the effect that if such surveys were made by railways of their own volition, regulation by commission would be less necessary. This is also true of lighting and power companies and is indicative of the attitude of progressive regulatory bodies. If public utilities generally had taken the rights of the public into consideration and voluntarily made such surveys and investigations necessary to determine the quality of the service rendered and the equitableness of the rates charged, the need for utility commissions would have been materially reduced and the industry as a whole would have been greatly benefited.

Taken altogether, one of the most pleasing aspects of the convention was the spirit of co-operation that was seen to exist between the Wisconsin Commission and the public utilities of the state. Representatives of the former took active part in all discussions and by means of a comprehensive exhibit undertook to explain fully the various methods adopted by the Commission, and the principles which underlie its rulings.

WIRELESS FOR SAFETY AT SEA.

From the beginning of the conference of the Revision Committee of the International Commission on Safety at Sea, it was certain that in the conventions arrived at and adopted the use of wireless telegraphy would be one of the outstanding features. The conference has practically completed its sittings at London, and the president, Lord Mersey, in making the closing speech, referring in a general way to all the subjects which had been discussed and on which agreements had been reached by the delegates, spoke particularly of the use of wireless telegraphy.

The convention adopted by the conference provides that all merchant vessels when engaged in international or colonial voyages, whether steamers or sailing vessels, and whether carrying passengers or not, must be equipped with wireless telegraphy, if they have on board 50 persons or more, except where that number is increased owing to causes beyond the master's control. The contracting states, however, have the discretion to make suitable exceptions in certain cases, the most important of which are vessels which on their voyages do not go more than 150 miles from the nearest land. A continuous watch for wireless purposes must be kept on all vessels fitted with wireless telegraphy as soon as the Government to which the vessel belongs is satisfied that such a watch is useful for purposes of saving life at sea.

Wireless apparatus must have a range of at least 100 miles and an emergency apparatus placed in a safe place, unless the main installation is in the highest part of the ship in conditions of the greatest safety.

The master of a ship in distress is to have the right to call for assistance among vessels which have answered his appeal from those vessels which he thinks are best able to render him assistance. The other vessels may then proceed on their voyage.

It is true that the beneficent purposes of wireless as an agency of rescue for ships at sea has been impressed vividly upon the popular mind through the thrilling stories which have always accompanied its demonstrations for the last few years. However, the making mandatory upon the part of the states interested in the conference is a fine recognition of the spirit of co-operation that exists today not only among the people of a community, but among the nations of the earth.

THE PRESIDENT AND THE TRUSTS.

With very little delay after his return from a brief vacation, Mr. Woodrow Wilson, president of the United States, has delivered to Congress and the American people his views with respect to what is commonly called "big business." It is too early to make comment upon even the outstanding features of the President's message, and it is also too soon to record anything of moment with respect to the tenor of criticism or suggestion upon the part of business at large.

There is no possibility of doubt respecting the President's patriotism and intellectual ability. There is no possibility of doubt respecting the patriotism and intellectual ability of those with whom the President has advised. Men well informed with respect to both the viewpoint of the heads of big business organizations and the ideas of the Administration are apprehensive of the future, chiefly because of the lack of understanding of so many people otherwise well informed of the terrific importance and stupendous proportions of the problems now facing the Administration. It will take statesmanship of the highest order, intellectuality of the greatest degree to work out a solution. In the meantime it is necessary that citizens of the United States, in no matter what position they find themselves, give careful study to what the Administration is striving to accomplish, and realizing that this is for the common good, work toward that end and place as little obstruction in the way as possible. Where ignorance exists it should give way to enlightenment; where prejudice exists it should give way to justice; where indifference exists it should give way to a zeal for active co-operation.

Briefly, what the Administration, as expressed in Mr. Wilson's message, seeks to accomplish, is:

(1) Effectual prohibition of the interlocking of directorates of great corporations—banks, railroads, industrial, commercial, and public service bodies.

(2) A law to confer upon the Interstate Commerce Commission the power to superintend and reg-

ulate the financial operations by which railroads are to be supplied with the money they need for their proper development and improved transportation facilities.

(3) Definition of "the many hurtful restraints of trade" by explicit legislation supplementary to the Sherman law.

(4) The creation of a commission to aid the courts and to act as a clearing house of information in helping business to conform to the law.

(5) Provision of penalties and punishments on individuals responsible for unlawful business practices.

(6) Prohibition of holding companies and a suggestion that the voting power of individuals holding shares in numerous corporations might be restricted.

(7) Giving to private individuals the right to institute suits for redress on facts and judgments proved in government suits, and providing that statute of limitations should run only from the date of conclusion of the Government's action.

It would probably be agreed by all that surrounding the message in all its portent there breathes a spirit of amity and the desire that in securing relief from the ills which have attended the great energies which have become vitalized during the last 20 years, there shall be a harmonious and constructive recognition of the elements of progress. The intent to accomplish a great good for a great many should be accepted. The whole question and each phase of it should be debated earnestly and considerately. A mistake now in the adjustment of any one of these suggestions might easily prove disastrous. Only through intelligent discussion and a willingness to discover the real facts in the light of many viewpoints will progress be made.

CO-OPERATION IN THE TELEPHONE INDUSTRY.

For several years there has been slowly growing in various branches of the electrical industry a strong spirit of co-operation based on the conviction that co-ordinated efforts result in much greater and more permanent development than random efforts frequently directed at cross purposes. This co-operative movement has affected nearly every avenue of electrical activity with a few important exceptions, among which has been the telephone industry.

Following the expiration of the fundamental telephone patents there sprang up numerous factories for telephone equipment and almost countless independent telephone operating companies. The keen rivalry between the two camps soon degenerated into open hostility and reckless and destructive competition. The air became surcharged with cries of monopoly, discrimination, cut-throat tactics, etc., as the result of which drastic legislation was enacted in many states and the charges for telephone service were reduced to such a point that even great deterioration of quality of service could not prevent many companies from going into bankruptcy. The public enjoyed low rates, but had to put up with miserable service and was burdened with supporting duplicate telephone systems. The investor in telephone securities enjoyed nothing but the pleasure of a fight.

Such conditions could hardly endure. It is to the credit of a few state utility commissions that traffic-interchange agreements received approval. The interests of the stockholders and also of the public compelled many telephone company officials to make an increasing number of such contracts in the last few years, but at the risk, on the part of independent telephone men, of being called traitors to what were conceived to be the principles of independent telephony. Meanwhile, the idea of government regulation of utility corporations was gaining ground and regulatory commissions have been established in most of the states. The increasing powers of these commissions and the fair and reasonable exercise thereof in nearly all cases have checked any evils connected with the natural monopoly of utilities and permitted the achievement of the many advantages attendant thereon. Consequently the need for maintaining unlimited competition has vanished.

The most important step in removing the hostility between the two great telephone interests in this country was the now famous letter, published in our issue of December 27, in which the American Telephone & Telegraph Company offered to place its long-distance lines at the disposal of independent telephone companies. Another long step in this direction is the excellent presidential address of Mr. Manford Savage, retiring president of the National Independent Telephone Association, which was presented to the convention last week and received the unanimous approval of that association; an abstract of this sane and broad-gauge address is given on another page of this issue. Mr. Savage points out clearly that in order to conserve the interests of investors in telephone securities a conciliatory attitude must be taken.

Despite the fact that the independent telephone interests are now divided into two rival groups, one dogmatically adhering to the principles that were perhaps necessary in former days to give independent telephony a foothold, and the other group courageously facing the conditions as they exist today, it is inconcievable that the best interests of telephony in general can prevail unless the issues of the day are fairly met. The assurance that the Interstate Commerce Commission and the several state utility commissions will represent the interest of the public and safeguard the interests of the telephone companies should augur well for carrying out properly the details of the pending agreement for interchange of service. But of this there can be no doubt, that the public as well as the telephone industry at large will be better off by cordially putting into practice the spirit of the day—co-operation.

Buffalo Electric Show.

The Jovian League of Buffalo has incorporated The Buffalo Electric Show Company, which will conduct an electrical show in the Elmwood Music Hall in that city from March 9 to 14. Arrangements for the show have reached a point which assures success. Over 7,000 square feet of floor space have been subscribed for, and the 3,000 square feet yet available will no doubt be taken up before the time arrives. The exhibits will be of a varied nature, including the latest novelties for the application of light, heat and power. A complete electrical restaurant will be one of the features.

The chairman of the committee in charge of the show is E. D. McCarthy. The chairmen of other committees are as follows: Space and Exhibits, W. E. Robertson; Finance, W. R. Huntley; Concessions, G. H. Calkins; Advertising and Publicity, L. F. Philo; Program, H. I. Sackett; Decorations and Illumination, J. J. O'Leary; Service, F. A. Coupal; Attractions and Entertainment, C. W. Underwood; Tickets and Admissions, L. W. Wipperman. The general secretary is Harry S. Hilliker.

Central stations, jobbers contractors and manufacturers are all co-operating for the success of the show. The decorations will be the most lavish ever seen in Buffalo. Inside and out the hall will be brilliant with electric light. A large electric fountain will be the central feature. Special excursions will be run from neighboring towns and the show will be thoroughly advertised.

A large and handsomely printed program will be given away to each visitor at the show. It will contain the history of electrical development on the Niagara frontier and interesting articles on the latest electrical devices, as well as a description of each exhibit.

Sea Safety Meeting Defines Wireless Equipment Status.

The International Conference on Safety at Sea Revision Committee, which has been in session at London, England, for several weeks, practically concluded its labors at the British Foreign office this week. Incomplete dispatches indicate that the question of wireless-telegraph equipment was settled by exempting ships carrying less than 50 passengers and also vessels plying within 100 miles of the shore from carrying wireless apparatus. December 14, 1914, is the time limit set for the acceptance by the various countries concerned of the convention adopted by the revision committee.

Bion J. Arnold to Talk to Chicago Electrical Engineers on Subways and Railroad Terminals.

At the next joint meeting of the Electrical Section, Western Society of Engineers, and the Chicago Section, American Institute of Electrical Engineers, to be held in the Society's rooms, Monadnock Block, Chicago, on the evening of January 26, Bion J. Arnold, past-president of each of these organizations, will give an illustrated lecture on "City Transportation, Subways and Railroad Terminals."

Chicago Electric Club Meeting.

At the weekly meeting of the Electric Club of Chicago on January 15, John D. Shoop, first assistant superintendent of schools, delivered a very inspiring address on "Good Fellowship." Preceding the address, J. A. Harney, club member, read a poem composed by himself which was well received.

Charles W. Peters, chief deputy sheriff of Cook County, will speak before the Club on January 29, on the subject of "Society's Criminals and How They Are Made."

Baltimore Section Discusses Electrification.

The Baltimore Section of the American Institute of Electrical Engineers held a meeting on January 9 at Johns Hopkins University, the subject being "The Electrification of Railroads." This was a popular meeting to which business men of prominence and leaders of other organizations in Baltimore had been invited. The chief speakers were: W. S. Murray, formerly electrical engineer for the New York, New Haven & Hartford Railroad, and N. W. Storer, of the Westinghouse Electric & Manufacturing Company.

Changes in Electrical Testing Laboratories.

A number of changes have been made in the personnel of the executive staff of the Electrical Testing Laboratories, Incorporated, of New York City. The present officers are as follows: President, John W. Lieb, Jr.; vice-president, Clayton H. Sharp; secretary, Preston S. Millar; treasurer, Joseph Williams.

Preston S. Millar will hereafter act as general manager, and Clayton H. Sharp as technical director. The chief engineer is F. M. Farmer.

Pittsburgh Jovians Give Smoker.

The Jovian Electrical League of Pittsburgh, gave a smoker in honor of W. M. Matthews, head of the national organization, and Mercury Ell C. Bennett, on Saturday evening, January 17. The smoker was held at the Fort Pitt Hotel.

Electrical Exports for November.

The following data relating to the electrical exports from the United States for last November are taken from the monthly summary of imports and exports issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C.

There was a slight falling off in the November total of electrical shipments compared with the same month in 1912, but the general average of the monthly totals of 1913 is well maintained by the November figures. The number of articles exported during that month for the four classes for which numbers are reported were: electric fans, 784; arc lamps, 887; carbon-filament lamps, 62,628; metal-filament lamps, 72,256.

In the following table are given the classified figures for last November, and also for the corresponding month of the preceding year, as far as the detailed figures for the latter are available.

Articles.	Nov. 1913.	Nov. 1912.
Batteries	$ 105,175	.....
Dynamos and generators	229,146	$ 192,424
Fans	11,049	11,730
Insulated wire and cables	181,436	.....
Interior wiring supplies, etc. (including fixtures)	64,232	.....
Lamps—		
Arc	14,197	12,189
Carbon-filament	8,614	20,188
Metal-filament	18,411	34,291
Motors	474,252	268,107
Static transformers	94,083	.....
Telegraph instruments (including wireless apparatus)	9,283	8,944
Telephones	106,609	115,752
All other	926,973	1,606,918
Total	$2,243,460	$2,270,553

Conference of the American Electric Railway Association.

The mid-year conference of the American Electric Railway Association will be held in New York City on January 29, 30 and 31. The annual banquet will be held on the evening of January 29 at the Waldorf Astoria Hotel.

The conference proper will take place on January 30 at the Engineering Societies Building and the following subjects have been selected for discussion: "The Economic Aspects of Regulation Compared With Profit Sharing With Municipalities;" "The Effect of Rate of Fare on Riding Habit;" "Inherent Hazards of the Electric-Railway Industry;" "Present-Day Influence of Labor on Legislation." Among the speakers will be Halford Erickson, of the Wisconsin Railroad Commission, and F. W. Hild, of the Portland Railway Light & Power Company.

Meetings of many of the committees of the American Electric Railway Association and allied associations will be held during the three days of the conference.

W. D. Ray.

Many men in every walk of life have achieved distinct social success and among their fellowmen have proven to be examples of deserved popularity, but have achieved this success and popularity at a sacrifice along commercial and business lines. Some men have achieved great commercial success, but by reason of their concentration to business and the elimination from their minds of everything of a social or civic nature, have stood in an almost isolated position so far as their brotherhood or fraternity with their fellowmen might be concerned. Then there are others who have achieved both social and commercial success and who occupy a position of popularity among their business friends, their close social friends and among a wide range of acquaintances in their own communities.

Of the latter class is W. D. Ray. Long and favorably known to the electrical fraternity as a genial, wholesouled gentleman of great ability as an engineer and executive, he has another side which has made him a leader in every community to which he has been attached, and in the fraternal and social organizations with which he has been connected.

William Daniel Ray was born at Normal, Ill., 40 years ago, and has been some 25 years in business, having been located eight years at Chicago; three years at Everett, Wash.; six years at Detroit; four years in Cleveland, and four years at Hammond, Ind.

Mr. Ray's education was confined to the common and high school courses at Oak Park, Ill. His early years were spent at practical electrical work, as electrical engineer for the Chicago & Northwestern Railway and the Chicago & Northern Pacific Railroad. In this position he had full charge of the various lighting and power plants operated by these roads, including their steam plants, and with the latter road also their electric and pneumatic equipment of switches and block signals on their Chicago terminals.

Later he was with the Standard Electric Company, of Chicago, as assistant electrical engineer, designing direct and alternating-current dynamos, motors and arc lamps.

Wishing to profit by the electrical development and achievements exhibited at the Chicago World's Fair, Mr. Ray became attached to the electrical department, and the close of the exhibition found him assistant superintendent of operation of that department. It was while here and during the World's Fair year that Mr. Ray collaborated with C. K. MacFadden in the book entitled "The Practical Application of Dynamo-Electric Machinery."

In 1894 he went to Everett, Wash., as superintendent of the electric railway there and later was made general manager, which position he held three years. During his connections there he patented an electric arc lamp.

In 1897 he returned to Chicago, entering the Chicago office of the Lorain Steel Company, in the capacity of sales engineer for their electric railway motors and car trucks, traveling in Illinois, Wisconsin, and as far west as Omaha and north to Minneapolis, until the Lorain Steel Company finally gave up the manufacture of railway motors and car trucks, their motor interests being disposed of to the Westinghouse interests.

William D. Ray.
General Manager of the Northern Indiana Gas and Electric Company.

Mr. Ray was then engaged for several years to introduce and promote as sales engineer the sales and installation of air-brake equipment in the electric traction lines of the country, and there met with marked success.

The Detroit Construction Company engaged him as electrical engineer for their traction properties, where he had charge of important engineering work in connection with power houses, sub-stations and overhead transmission of two 75-mile roads—the Detroit, Lake Orion & Flint Railway and the Grand Rapids, Holland & Lake Michigan Railway. After finishing these roads, he superintended the construction of the Grand Rapids, New Haven & Muskegon Railway, a third-rail system for the Westinghouse interests.

From 1905 to 1909, Mr. Ray was contract agent of the Electrical Department of Chicago in the sale of electric power from the large hydroelectric plant developed in connection with Chicago's Drainage Canal.

In 1909, Mr. Ray became associated with Mr. Geist as manager of his gas and electric properties in the Calumet District at Hammond, East Chicago, Indiana Harbor and Whiting. In 1910, the United Gas Improvement Company became interested in Mr. Geist's properties in Northern Indiana, which includes Michigan City, South Bend, Mishawaka and Plymouth. This district has shown a remarkable industrial development in the past five years.

Mr. Ray is a member of the American Gas Institute, National Electric Light Association, National Commercial Gas Association, vice-president of the Indiana Electric Light Association, and now director of the Indiana Gas Association. He is a member of the Hamilton Club of Chicago, director of the Hammond Chamber of Commerce, director of the Manufacturers' Association, and director of the Hammond Country Club.

He is a thirty-second degree Mason, a Knight Templar, and in December last was elected Illustrious Potentate of Orak Temple of the Mystic Shrine. This is one of the most important posts in Masonry, covering one of the largest divisions of the Masonic Order, and one of the most famous Shrines in Masonic circles all over the United States.

Colonel Bailey to Address Vehicle Association.

The January meeting of the Electric Vehicle Association of America will be held on January 28, at 8 p. m., in the Engineering Societies Building, 29 West Thirty-ninth Street, New York City. Col. E. W. M. Bailey will give an illustrated description of his trip in an electric automobile from Boston to Chicago, by way of New York.

New England Vehicle Meeting.

The January meeting of the New England Section, Electric Vehicle Association of America, was held at Salem, Mass., January 15. In the afternoon a parade of about a score of electric pleasure cars, trucks and service wagons was held. A route covering about 11 miles, through Beverly, Peabody and Salem, was traversed, the line of vehicles bearing advertising placards attracting much attention from business men and residents along the route.

At 6 p. m. the visitors dined at the Salem Club, after which a public meeting was held at the Board of Trade rooms, at which leading merchants and manufacturers of the city were present. J. A. Hunnewell, chairman of the Section, presided. The Committee on Membership reported that twelve members have been added since the November meeting. J. C. Codman, for the Meetings Committee, stated that four more meetings will be held this season, one of them probably at Hartford, Conn. Secretary O. G. Draper reported for the Garage Committee that a half-dozen garages in Boston have adopted a uniform scale of charging rates, together with distinctive advertising insignia.

Mayor John F. Hurley, of Salem, welcomed the visiting delegation, and President Day Baker of the Electric Motor Car Club of Boston responded. H. T. Sands, of the Tenney public service companies, of which the Salem Electric Lighting Company is one, said that central stations welcomed the introduction of the electric frankly because of the income to be derived from the sale of current for them, and would not help to induce merchants and manufacturers to introduce them if they were not confident this type of transportation would prove the most efficient.

H. F. Thompson, of the research division of Massachusetts Institute of Technology, gave an address on "The Simplicity of the Electric." Realizing that his audience was composed mainly of non-technical men, Mr. Thompson clearly demonstrated that the storage-battery car is without a rival in the simplicity of its mechanism and the ease of operation. The care of batteries is not so onerous as that of horses, which are subject to ailments and epidemics. The speaker related an instance where a manufacturer delivered a car without instructions as to renewing the battery solution. The purchaser operated the car a year before he became aware that he should add water to the electrolyte. The public accepts the electric trolley car as an established agency of transportation, but views electric motor cars as more or less experimental. The prejudice against the latter on the score of limited speed and mileage is being dispelled by such trips as Colonel E. W. M. Bailey recently made from Boston to Chicago.

Records given of registered electrics in Massachusetts for the two years past were:

	December 31, 1912.	December 31, 1913.
Passenger	487	604
Commercial	262	409
	749	1,013

Gain in 1912, 17 per cent; gain in 1913, 35 per cent.

Mr. Thompson stated that the final report on the study that has been conducted by himself and others of the Institute of Technology will be available in about a month. The gist of the results is that in commercial work the electric car is cheaper than either the horse or gasoline wagons for a large portion of city deliveries and trucking services.

Frank J. Stone, of the Electric Storage Battery Company, gave a stereopticon lecture on the construction and application of storage batteries, showing pictures and describing their use in connection with car lighting, submarine propulsion, wireless operation, street-car service and as emergency equipment of city lighting companies. Slides showing detailed construction of batteries and also of the workings of the company's factory were exhibited.

George W. Holden, of the Edison Storage Battery Company, described the construction and uses of the batteries of that company's manufacture.

Chicago Jovians Discuss Electric Starters.

E. L. Jones, of the Jones Electric Starter Company, was the principal speaker at the regular meeting of the Jovian League of Chicago on January 19. "It is estimated by those in close touch with the situation that the value of the electric-starter business in 1914 will aggregate $25,000,000," said Mr. Jones, "and when it is considered that the industry has only been established a year or two the significance of these figures can be appreciated."

Speaking of the requirements of electric starters for gasoline automobiles, Mr. Jones said that the first requisite is the ability to spin the engine readily, and under adverse conditions, such as low gasoline supply, poor ignition, extreme temperatures, etc. Next, the starter must recharge the storage batteries at a normal rate, when running as a generator. A system for adequately regulating the charging current is a third requisite. In connection with the latter simplified wiring is much to be desired.

The starters at present available can be classed under two heads, those comprising a combination machine which acts as a motor when starting the engine and as a generator when the engine has attained sufficient speed; and those comprising two separate machines: a series motor for spinning the gasoline engine and a shunt generator for charging the batteries.

Mr. Jones said that there is a tendency on the part of some manufacturers to eliminate the magneto taking current for ignition directly from the battery when running. When running at low speed this system has many advantages because of the inability of the magneto to generate high voltage at slow speeds. At high speed, however, the magneto is to be preferred. Mr. Jones stated, in answer to questions that the horsepower required by the generator of a starting and lighting equipment averages 0.25 horsepower. The cost of gasoline for operating a starter for 10,000 miles was found on test to total only $7.50.

In the absence of Statesman Niesz, F. W. Harvey, Jr., alternate statesman, presided at the meeting.

Public Safety Discussed at Chicago Electric Vehicle Meeting.

Members of the Chicago Section, Electric Vehicle Association of America, were urged to extend their co-operation in the public-safety movement which is being undertaken by the Public Safety Commission of Cook County by Coronor Hoffman and G. H. Whittle, president of the Commission, in addresses delivered before the Section, on January 20. Mr. Whittle presented statistics on accidents in general and pointed out that their prevention can be brought about by education and legislation. The activities of the Public Safety Commission were outlined in detail.

Coronor Hoffman cited accidents that have come to his attention and stated that in almost every instance recommendations could be made which, if enforced, would prevent or reduce the number of similar ones. Mention was made of the increasing number of automobile accidents and it was pointed out that if drastic action is taken against habitual offenders the industry as a whole will benefit.

Telephone Employees Meet at Pittsburgh.

Representatives of Bell telephone companies held a two-day meeting in Pittsburgh, Pa., on January 9 and 10, with such success that it was decided to make the meeting an annual event.

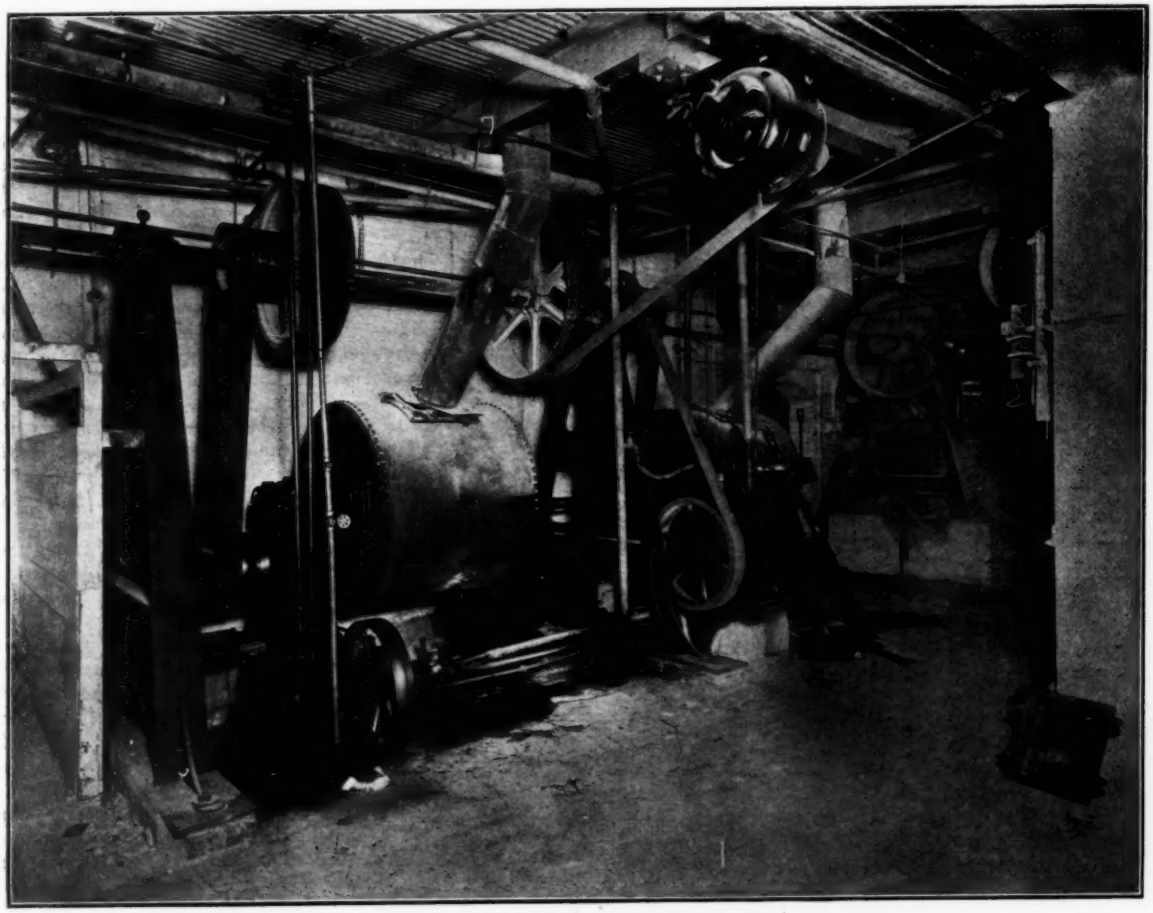
At the closing session W. W. Henderson, district commercial superintendent of Pittsburgh, spoke on "Results and Expectations." C. H. Lehman spoke on "Methods and Practice;" and W. B. Clarkson on "The Personal Equation in Our Dealings With the Public." This was in the nature of a state convention and most of the cities and towns in Pennsylvania were represented.

Electricity in Potteries.

The present-day processes in pottery manufacturing plants which require accuracy, rapidity, continuity and a well designed system for each department of the work as well as for the process as a whole, make the use of electric drive essential. Data are presented in this article showing that, in addition, actual economies in operating costs are effected by the use of motor drive and central-station service.

Natural development and increasing competition have produced many requirements in the operation of clay-working industries. In recent years the method of machine drive has become an important subject, and manufacturers of brick, tile, poreclain and pottery are recognizing the electric motor as an improved unit of driving power which is unsurpassed for convenience of application, satisfaction in use, and economy in the operation of clay-working machinery.

In the contemplation of the layout of a brick, tile, or pottery plant, the first point for consideration is the location. Railroad facilities, water, coal, location of raw material are very important factors. The use of electricity, especially when supplied by central stations, simplifies the problem, since the water and coal questions become of secondary importance. The various departments of the plant can then be located and arranged to the best advantage for operating without limitation of arrangements imposed by central engine drive, with belt connections to the various departments.



View of Motor-Driven Machines in Thomas Maddock Sons Pottery, Trenton, N. J.

When the various machines or departments are operated by means of individual motors, there is greater assurance of continuous operation compared with the central engine drive, in which case engine trouble means the shut-down of the entire plant. Motors maintain a practically constant speed throughout their operating range, which results in increased production as compared with the plant driven by single steam engine, where the speed varies not only with the boiler pressure, but also with the variation in load.

The manufacture of pottery and enameled decorative floor and mantel tile have, as a class, been slow to look into the question of motor drive for their apparatus, especially in connection with purchased power, as the use of exhaust steam in the dry rooms has been considered as outweighing all other considerations. The nature of the work is such, however, that individual motor drive offers many advantages, and such installations as have been made show decided savings, accompanied by an increase in output. The use of belts and line shafting in factories of this type is especially disadvantageous, on account of the fine clay powder which fills the air and collects on belts and pulleys, works into the hanger bearings, etc., producing excessive belt slippage and large friction losses. Considerable difficulty is often experienced in keeping the machinery at proper speed on full load, and the output of the plant is in many installations limited on ac-

count of the belt slippages. The introduction of individual motor drive will, in such cases, increase the output of the factory by ten to thirty per cent without any other increase in factory equipment, extra floor space or increased labor.

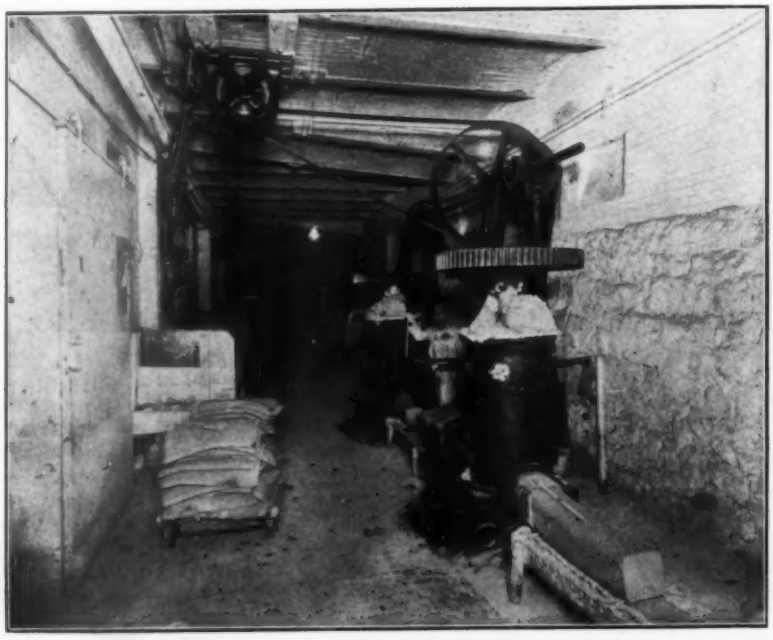
The cycle of operations in pottery manufacturing are well described in a recent issue of one of the leading clay journals, Brick and Clay Record.

In making tile, the dry process is used. That is, the material when pressed into the molds is a fine dry powder. In the wet process, used in the manufacture of pottery, the material is in the form of a wet clay when molded into its final shape. The initial preparation of the raw material, however, is identical in the two processes.

The material from which both tile and pottery are made consists of a mixture of flint, feldspar and clay. A charge of these substances, weighing 4,000 pounds, is thoroughly mixed with sufficient water to give it the consistency of heavy cream in a large tank called a "blunger mill." The mixing is done by means of paddles revolving on a vertical shaft, which is direct-connected to a horizontal driving shaft by means of a bevel gear. The charge is stirred from four to six hours until a uniform consistency is secured. The "slip," as the mixture of clay and water is called, then goes to a sifter, where a copper wire screen with a mesh of 100 per inch, oscillating at about 400 times per minute, removes all lumps, pebbles or foreign matter, but allows the slip to pass into a storage cistern called an "agitator," where it is kept until ready for use, usually only a few hours. As the flint and feldspar are insoluble, and would soon settle to the bottom if left standing, a paddle is rotated in the cistern at a rate sufficient to keep the mixture in constant motion.

10-Horsepower Motor Driving Pumps in Pottery.

The blungers, sifters and agitators are mounted in close proximity to eliminate pumping, and are ordinarily driven by belts from a line shaft. These belts are very much in the way, and, when a heavy charge is put in the blungers, the slippage is quite large, causing a decided reduction in the capacity of the mills. Direct motor drive has increased the output by 15 per cent over that secured by the use of belts from the same machines in plants where installed.

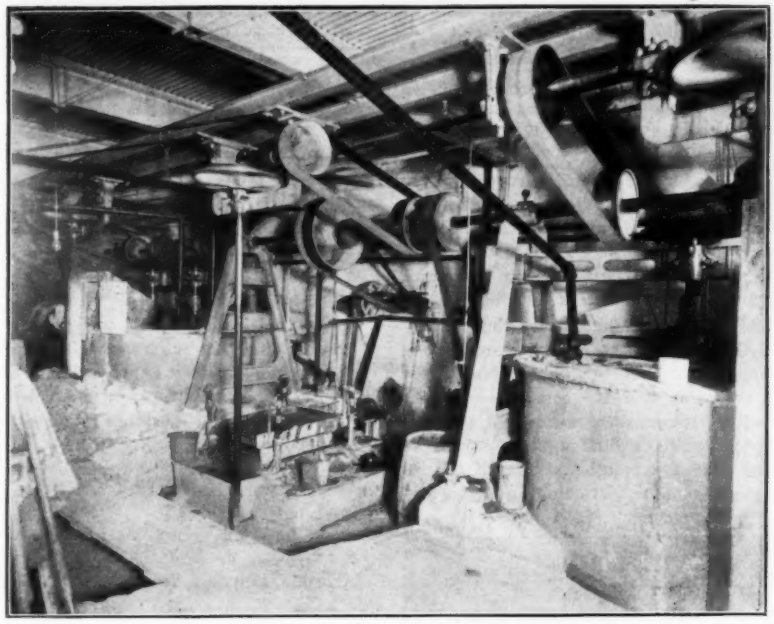


Motor-Driven Pug Mills in Maddock Pottery.

From the agitator, the slip is pumped into the slip press, a rack containing a number of iron plates, between which are canvas sacks. The pressure from the pumps is sufficient to press the greater part of the water out through the canvas, and leave layers of the clay deposited between the plates. These pumps which lift the slip to the presses operate against very little pressure as they start pumping into the empty presses. As the press gradually fills, the pressure increases until by the time its capacity is reached the pumps are operating at a pressure of from 100 to 110 pounds. With belt drive very large heavy belts are used at excessive tension, the slippage increases very rapidly with the pressure, increasing the amount of power and the time required to pump a charge. With pumps driven by belts, 45 to 50 minutes are required to pump a charge of one ton. With a motor geared to the pumps, the same work is done in 15 minutes.

The clay at this stage is moist and sticky, and is, by reason of the treatment it has passed through, uniform in composition and free from lumps, pebbles or foreign material.

The processes in the manufacture of tile and pottery are identical until the wet clay is removed from the slip presses. From this stage the processes are different. To secure the dry material for the making of tile, the wet clay from the slip is placed on racks in a heated drying room, where all the moisture is evaporated. The hard clay is then passed through a crusher, which breaks it up into small pieces, after which it is ground into a fine powder in the dust mills. These mills are usually 36 to 48 inches in diameter, and are provided with paddles.



Pottery Machinery Driven by 25-Horsepower Motor.

or fans, which revolve at about 1,200 revolutions per minute inside a cast-iron case.

On account of the high speed, necessitating large pulleys on the driving shaft and small ones on the mills, and on account of the dust which continually accumulates on the belts, forming a glazed surface, the driving of a dust mill by means of a belt offers many annoying features. The heavy tension to reduce slippage produces large friction losses, while considerable trouble is frequently experienced from belts breaking, or jumping off the pulleys. With line-shaft drive it is necessary, in such cases, to slow down or stop the engines to replace one belt, thus delaying the work in the entire plant. Even when no such trouble is experienced the slippage is usually large enough to appreciably decrease the output. Thus, in one plant, the dust mill ground only four tons of clay per hour when driven by belt without interruptions, while when direct-connected to a motor, the output was increased to five tons per hour, and, owing to the more uniform speed, a finer quality of dust is secured than was possible before.

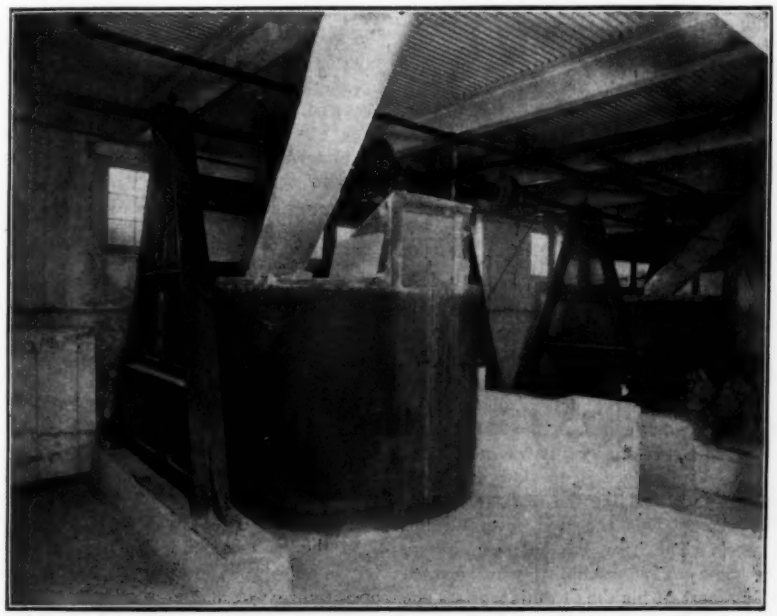
The fine, dry powder produced by the dust mills is molded into forms by hand presses, after which it is ready for the initial firing.

Pottery ware, as previously stated, is molded from the moist clay. The clay from the slip presses is of the right consistency, but is liable to have the moisture unevenly distributed throughout the cakes. These are, therefore, passed through a pug mill, to insure uniformity of the materials. This mill is a round tank, open at the top and having a vertical shaft with a number of paddles, which when revolving mix the clay and at the same time push it to the end of the tank where it is pressed through a die about eight inches in diameter located near the base. The clay from the pug mills, is then molded into the finished ware on machines called "jiggers" or "jollies." This green ware is soft and full of moisture and is accordingly thoroughly dried in a heated drying room called the "green" room.

The firing of the ware is practically the same for both tile and pottery work. The dry ware is exceedingly brittle and easily damaged, and is protected from injury in the kilns by being inclosed in fireproof clay receptacles, called "saggers." The temperature depends on the quality and thickness of the material to be burned. In order to determine the temperature of the ware during the firing, several pointed cones, built up of flint and clay, are placed in the kiln where they can be observed through a peephole. The cones are numbered, according to the amount of heat they will stand, the melting point being determined by the percentage of flint. When the sharp points of the cones bend from the heat, the potter knows by experience the temperature he is getting.

After the initial firing, the ware is decorated, refired and glazed. The raw material from which the glazing is made resembles glass very closely. It is ground up in the glaze mills, which are similar to the tube mills used in cement works and mines. They consist of steel cylinders lined with porcelain brick and containing several hundred pounds of small cobble stones, the "frit," as it is called, being ground up between the sides of the rotating cylinder and the pebbles. When ground into a fine dust, the frit is mixed with water and is ready for use. Pottery ware is dipped entirely into the glazing. Tile is glazed on one side only. The ware is again fired, and is then ready for the market.

Both tile and pottery ware are placed in sagars for each firing. This constant handling breaks a large number of the sagars so that it is always necessary to have a sagar department in order to keep up the stock. The broken sagars are crushed in a "grog" pan of the type shown. This consists of a pan five to seven feet in diameter, the bottom of which is made of cast-iron plates full of fine slots. Suspended in the pan are



Motor-Driven Glaze Pans.

two heavy steel rolls, each weighing from 600 to 700 pounds. Material thrown into the revolving pan is crushed under the rolls and sifted through the slots in the bottom of the pan into a bin. This material, known as "grog," is mixed with clay, passed through a pug mill and formed into new sagars, which are fired and are then ready for use.

In the sagar department there is usually a "wad" mill, similar in construction to a pug mill, except for the die at the bottom of the mill. In the wad mill this die has a large number of holes through which the material is pressed, forming strings of clay, which are placed between the sagars when they are stacked up in the kiln, to keep them from burning together.

The wad mill, grog-pan, sagar, pug mill and sagar press can all be driven with advantage by individual motors, with a considerable saving of both power and labor. In fact, one of the notable features of the change from belt to motor drive is the increased output per man which is thereby effected. On the other hand, the glaze mills are usually driven in a group, as a nearly uniform load can thus be secured on the motor, and the friction losses are usually not excessive.

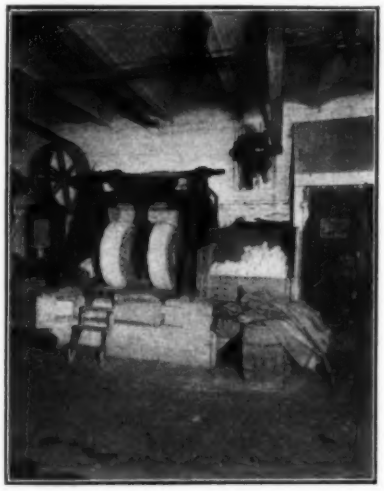
In one Ohio pottery investigated, an 80-horsepower Corliss engine was formerly used driving a long line shaft in the preparation room, operating the blunger mills, sifters, agitators, slip pumps, crushers, dust mills, and dust-mill conveyors and sifters. The company also had an 80-horsepower gas engine driving a generator which furnished power for motors operating group drives in the machine shop, ball mills, sagar and glaze departments, and also the necessary current for the lighting system. With this equipment, the power costs per month were as follows:

Engineer's salary	$ 65.00
Coal and gas	180.00
Up-keep of belts	25.00
Loss due to shut-downs on account of belt troubles	25.00
Oil and waste	20.00
Gas engineer	6.25
Gas engine maintenance and repair	25.00
Five per cent loss in time due to gas engine shutdowns	60.00
Incidentals	8.25
Total	$414.50

The belt troubles mentioned were largely at the dust mills where considerable difficulty was experienced on account of belts breaking and also jumping off, due to the high speed and the necessity of using such large pulleys on the line shaft and small ones on the mills. Every time a belt came off it was necessary, in order to replace it, to slow down the engine, thus delaying the work in the entire plant. This occurred several times a week. The item, gas engineer, covers the time of a machinist who devoted only a part of his time to this work. The steam engineer, in addition to the care of the steam engine, also took care of all belt repairs and the oiling and care of the shafting.

The demand for power at this plant finally became greater than its capacity, and the company disposed of its engine equipment and installed motors, buying power from the Ohio Electric Railway Company, of Zanesville, Ohio. The belts were eliminated entirely in the preparation room, and, in fact, there are but six driving belts left through the entire factory, with 35 motors installed.

As a result of the change, the capacity of the entire plant was increased fully 20 per cent over the old method, while at the same time the cost of power, including repairs, does not exceed $150 per month. This affords a clear saving of over $250 per month in spite of the increased output. In addition an appreciable saving in labor was effected. In the sagar department, for instance, eight men were formerly required to keep up the stock of 85,000 to 90,000 sagars required. Motors geared direct to the grog pan, pug mill and sagar press have so increased their capacity that six men are now able to keep up this stock.



Motor-Driven Chasers in Pottery.

One serious difficulty confronting the management at the time of the proposed change was the heating of the dry room, which had been heated by the exhaust steam from the engines. At present the company is utilizing the waste heat from the kilns. When a kiln is drawn, after the material has been burned, the fire is shut off and the kiln and its contents allowed to cool slowly. This heat is now drawn by a fan and blown through the dry rooms, and, as there are always several kilns being drawn at one time, there is more than enough heat.

In the plant of the Canonsburg Pottery Company, Canonsburg, Pa., where operating expenses are an important consideration, electric drive offers decided advantages. This company operates two plants of approximately the same size, one of which is equipped with electric drive; the other is driven by a 75-horsepower steam engine and has approximately 250 feet of shafting. The electrically-driven plant burns coal under 100-horsepower boilers, 40-pounds pressure supplying steam for heating and drying, while the engine plant burns gas under a 100-horsepower boiler at 80 pounds. For supplying steam for heating and drying and for the engines.

A fair idea of the comparative sizes of these plants may be obtained from the following equipment of producing machinery, the sizes being about equivalent for the same size of machines in the different plants.

Electrically Driven Plant.

3—Single blungers
2—Agitators
1—Sifter
1—Double blunger slip pump
3—Cylinder presses
1—Pug mill
10—Kilns
100 men employed.

Electrically Driven Plant.

1—Single and 2 double blungers
2—Agitators
1—Sifter
1—Double blunger slip pump
2—Cylinder presses
1—Pug mill
7—Kilns
70 men employed.

The main output of these plants consists of porcelain, dinner and china ware.

The monthly operating costs of each plant compare as follows:

Engine-Driven Plant.

Gas bill for heating and power	$286.00
One engineer	65.00
	$351.00

Electrically Driven Plant.

Power bill	$ 69.68
Coal bill	61.00
One engineer	65.00
	$185.68

Difference in favor of the electric drive, $165.32.

It might be mentioned that gas is more expensive for the amount of heat produced than the coal at the prevailing prices, but the saving in labor makes part if not complete compensation. In this case, the saving in power by electric drive amounts to about 90 per cent interest on the cost of the motor installation.

Increased facilities in handling the products is an important feature in this comparison, since the glaze mills in the engine-driven plant, which are at present located in the sifting room could be placed in or near the glaze room, as they are in electric plants, where they are much more convenient.

Pottery Manufacturing Data—Sheet No. 1.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Pottery plant operates a seven-furnace high-voltage porcelain insulator works. The output is approximately 30,000 insulators per day. There are 110 men and 70 girls employed working 10 hours per day.

Total connected horsepower, 71. Total number of motors installed, 13. Average kilowatt-hours per month, 12,074. Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	12,830	May	11,760	September	10,730
February	13,770	June	14,049	October	11,230
March	12,370	July	12,580	November	11,430
April	13,070	August	10,760	December	10,310

Load-factor, 31 per cent; operating-time load-factor, 63 per cent.

The approximate electrical energy consumption per 1,000 insulators manufactured is 14.7 kilowatt-hours.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-Power.	Speed R. P. M.	Type	Application.
1	2	1700	Squirrel Cage	Belted through two countershafts to a 6-inch molding machine.
2	1	1700	Squirrel Cage	Each belted through a countershaft to a three-inch molding machine.
1	5	1700	Squirrel Cage	Belted to a 24-inch exhaust fan.
1	15	1120	Slip Ring	Belted to a 65-foot shaft (13 hangers) and 77 feet of countershafting (16 hangers) driving three 5-foot by 5-foot pug mills; one Patterson 4-inch by 12-inch, two-cylinder pump; one 4-foot by 4-foot vibrating table 2-inch stroke; one 10-foot by 14-foot mixing tank; one 10-foot by 2-foot agitator; seven 6-inch insulator templates.
1	3	1700	Squirrel Cage	Belted to a 30-foot shaft (six hangers), and an 8-foot countershaft (four hangers), driving one 30-inch threading die; one 16-inch by 6-foot engine lathe; one double emery wheel (8-inch and 12-inch wheels).
1	15	1120	Slip Ring	Belted to an eight-foot shaft (four hangers) and a four-foot countershaft (two hangers), driving two 36-inch by 24-inch pug mills (three 3-inch nozzles on each mill).
1	15	1120	Slip Ring	Belted to a 52-foot shaft (14 hangers) and an eight-foot countershaft (four hangers), driving one 4-foot by 3-foot color mill; two 5-inch by 30-inch color mills; two 20-inch by 30-inch pug mills, (three 3-inch nozzles on each mill); one 48-inch roll pulverizer.
1	1	1700	Squirrel Cage	Belted to a 20-foot shaft (four hangers), driving one 6-inch molding machine; three smoothing lathes.
1	3	1700	Squirrel Cage	Belted to a 4-foot shaft (two hangers) and a 4-foot countershaft (two hangers) driving one six-inch molding machine.
1	3	1700	Squirrel Cage	Belted to a 4-foot shaft (two hangers) and a 12-foot countershaft (six hangers) driving three three-inch molding machines.
1	5	1700	Squirrel Cage	Belted to a 30-foot shaft (nine hangers), driving eight three-inch jiggers; one double six-inch emery wheel.
1	2	1700	Squirrel Cage	Belted to a 40-foot shaft (10 hangers) and a 4-foot countershaft (two hangers), driving five five-inch smoothing lathes; three two-inch smoothing lathes; one three-inch insulator press.

Pottery plant making glass-furnace linings and crucibles.

Total connected horsepower, 75. Total number of motors installed, 1. Average kilowatt-hours per month, 3,510. Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	3,100	May	3,700	September	4,300
February	2,700	June	3,100	October	4,100
March	2,700	July	3,300	November	3,600
April	3,200	August	4,500	December.	3,900

Load-factor, 8.6 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-Power.	Speed R. P. M	Application.
1	75	690	Belted to a 15-foot shaft (5 hangers), driving one C. & A. Potts No. 3-P four-roll cylinder crusher, upper cylinder runs at about 1,200 revolutions per minute; one American Clay Machinery Company 10-foot pug mill; and one American Clay Machinery Company 8-foot pug mill. A small steam engine is also employed in this plant.

Pottery Manufacturing Data—Sheet No. 2.

Plant manufacturing a line of semi-porcelain dinner and toilet ware using the wet process exclusively. There are four glass kilns and three biscuit kilns the output being 12 kilns of finished ware per month. All heating is done by steam from a 100-horsepower coal-fired boiler at 40 pounds pressure. About one ton of coal is used per day in summer and a maximum of five tons per day in the coldest weather. An average of 7.5 tons of dry clay is used per day. 8,000,000 cubic feet of natural gas is required per month for burning the ware. There are 70 men employed working nine hours per day six days per week.

Total connected horsepower, 64. Total number of motors installed, 9. Average kilowatt-hours per month, 2,980. Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	2,000	May	3,320	September	2,760
February	2,900	June	3,550	October	3,460
March	2,980	July	1,870	November	2,940
April	2,400	August	3,200	December	2,740

Load-factor, 8.5 per cent; operating-time load-factor, 21 per cent.

MOTOR INSTALLATION.

The supply source is three-phase, 60 cycles, 220 volts

No.	Horse-Power.	Speed R. P. M.	Application.
1	5	850	Back-geared and geared to a Patterson Foundry & Machine Company 4-inch by 12-inch double-plunger slip pump, making 22 strokes per minute.
1	15	850	Back-geared and geared to a 25-foot four-bearing shaft on blungers, and a 10-foot, three-hanger countershaft, driving three blunger mills geared to main shaft, each making 34 revolutions per minute; one single mill 5 feet 5 inches diameter by 4 feet 4 inches high and two double mills each 5 feet by 5 inches wide, 9 feet 10 inches long and 4 feet 4 inches high; one Patterson Foundry & Machine Company rough agitator 9 feet diameter by 3½ feet deep, 20 revolutions per minute; one Patterson Foundry & Machine Company smooth agitator 9 feet diameter, 10 feet deep, 20 revolutions per minute; one Patterson Foundry & Machine Company rocking motion sifter 4 feet by 2.5 feet screen, 150 strokes per minute.
1	5	850	Back-geared and geared to a Patterson Foundry & Machine Company 4-foot by 5-foot color grinding cylinder, 28 revolutions per minute.
1	7.5	690	Back-geared and geared to a Crossley taper barrel-body pug mill 20 inches maximum diameter by 40 inches high, 5.5 revolutions per minute.
1	2	1120	Belted through a short countershaft to a 15-foot clay elevator, 14-inch by 16-inch flat buckets, 15 feet per minute.
1	5	690	Belted to a 110-foot shaft (11 hangers) 175 revolutions per minute, driving seven Patterson Foundry & Machine Company small friction jollies for making cups, saucers, plates, etc.; two Patterson Foundry & Machine Company jumbo friction jollies.
1	15	850	Back-geared and geared to an 8-foot, two-hanger shaft, driving one Patterson Foundry & Machine Company vertical wad mill, 24 inches diameter by 36 inches high, 13 revolutions per minute; one Patterson Foundry & Machine Company 5-foot grog pan, 34 revolutions per minute, rolls 36 inches by 5 inches; one Patterson Foundry & Machine Company taper body sagger pug mill, 24 inches maximum diameter by 36 inches high, 11 revolutions per minute; one grog elevator, 10-foot lift, 4-inch by 6-inch buckets.
1	10	690	Back-geared and geared to a 30-foot, four-hanger shaft, 70 revolutions per minute, driving three Patterson Foundry & Machine Company 4-foot glaze grinding cylinders; one Patterson 1.5-inch by 6-inch single-plunger glaze pump, 17 strokes per minute; one Patterson small glaze sifter, 10-inch by 24-inch screen; and one Patterson glaze agitator, 5 feet diameter by 6 feet high.
1	0.5	1120	Belted to 9-inch emery wheel.

Plant manufacturing structural concrete tile by the new wet process. Approximately 3,000 tile of various sizes and sections are turned out per day. The maximum capacity is 10,000 tile. Fifteen men are employed, working nine hours per day.

Total connected horsepower, 17.5. Total number of motors installed, 2. Average kilowatt-hours per month, 689. Average kilowatt-hours per month for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	853	May	751	September	473
February	1,502	June	729	October	457
March	965	July	523	November	321
April	710	August	517	December	472

Load-factor, 7.2 per cent; operating-time load-factor, 17 per cent.

The approximate electrical energy consumed per 1,000 tile is 10.7 kilowatt-hours.

MOTOR INSTALLATION.

The supply source is two-phase, 60 cycles, 220 volts.

No.	Horse-Power.	Speed R. P. M.	Application.
1	10	850	Belted to a 35-foot shaft, 372 revolutions per minute (six hangers) and a two-hanger countershaft driving one agitator, 15 feet long by 24 inches wide, 36 strokes per minute of paddle.
1	7.5	1120	Belted to a 15-foot shaft, 280 revolutions per minute (three hangers) and one two-hanger countershaft driving one Broughton mixer; and one drum hoist to draw a load of 950 pounds up a 30-degree incline in approximately 15 seconds.

Commercial Practice
Management, Rates, New Business

CENTRAL-STATION POWER FOR A WASHING-MACHINE FACTORY.

By F. S. Dewey.[1]

The Voss Brothers Manufacturing Company, located in Davenport, Iowa, is one of the largest washing-machine manufacturers in the United States if not in the world. No line of improvement in the manufacture of machines in this establishment has contributed more to the securing of low cost of production and high grade of output than the adoption of the electric motor drive.

In the manufacture of washing machines the adoption of the proper woodworking machines was an important factor and the placing of these machines was another important factor. With the old line-shaft drive the machines were located so that they might obtain their power from the line shafting and countershafting. They were not so located that the material on its way through the factory would follow from one machine to another in the proper sequence. One of the reasons that electric motor drive was decided upon was because with this drive the machines could be located anywhere, irrespective of a line shaft. As a result of this the factory is much better lighted and the danger of an accident to an employee is reduced to a minimum.

Woodworking forms the larger part of washing-machine manufacture, and the many advantages of motor drive in this industry are well known. With the electric drive each machine can be stopped and started as the nature of the work demands.

The factory building of the Voss company is a new one with two floors and basement. In the basement is installed the heating system and the machines used in the manufacture of the metal parts of the washing machines. The first floor contains all of the woodworking machines and on the second floor final assembling is done.

General View of Assembling Floor, Voss Brothers Washing-Machine Factory.

Before electric drive was installed careful consideration was given the subject of purchasing power. Central-station power in this case was adopted only after all phases of the situation had been thoroughly considered. The washing-machine manufacturer as well as woodworking factories in general must of necessity look to the present off fall as a greater source of revenue in the future, as the by-products that can be obtained from the wood waste far exceeds the fuel value of the wood.

1 Assistant superintendent, People's Light Company, Davenport, Iowa.

The manufacturer who depends upon the utilization of wood in turning out his product must of a necessity in the future look to the saving in the cost of production as a part of his net earnings. In order to make this saving he must cut down his operating expenses. The electric motor drive lends itself in making these needed reductions. By the eliminating of a large amount of line shafting and belting the power consumption may be reduced 25 per cent to 75 per cent. The quality of the product will be improved because with the electric motor a more constant speed may be maintained. With the elimination of line shafting and unnecessary belting a better system of illumination can be secured which all makes for improved product.

The ability to operate any machine independently of all others in the factory or the ability to operate any desired department or group of machines at one time, are some of the big advantages of electric drive. Another decided advantage, if the proper motor to meet the operating conditions of the machine is selected, is that the electric motor may be overloaded 50 per cent for 30 minutes without endangering the motor.

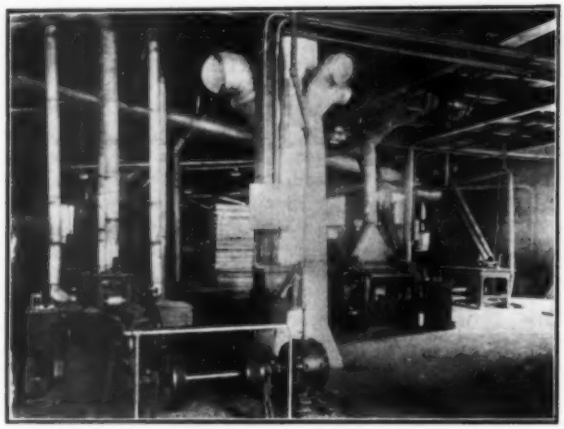
The installation of electric motors in any position enables the manufacturer to so arrange the different machines in the factory so that the work may be carried through the factory in the proper sequence, no unnecessary handling of material being necessary. This item, alone, is of greatest importance.

The adoption of central-station service by the Voss Brothers Company has resulted in considerable saving over the mechanical system of power transmission formerly employed. Although dry kilns are operated continuously no coal is ever purchased, the sawdust and refuse, not salable, being sufficient to furnish all steam necessary. Considerable revenue is obtained from such refuse as can be profitably sold.

The sawdust is delivered by fan into boiler room. It is shoveled into the boilers by hand. The system used in dry kilns is as follows. A small engine taking steam from boiler at 60 pounds pressure drives a large fan. This draws air in from kilns over a set of steam coils and discharges it back to kiln. The exhaust of the engine is used in the steam coils. All condensed steam is returned to the boiler by a vacuum pump, the only loss being in steam supplied to the glue pots. Another small engine and fan is used to heat the building.

The kilowatt-hour consumption of this installation for a period of 12 months is: January, 2,920; February, 3,270; March, 5,320; April, 5,340; May, 5,540; June, 4,840; July, 4,460; August, 4,690; September, 5,100; October, 5,160; November, 5,210; December, 4,620.

The details of the motor drive are as shown in the table.



First Floor Showing Stave Machines.

Tub Machines on First Floor.

No.	Horse-power	Speed R.P.M.	Application.
1	7.5	1,120	Belted to a 60-foot shaft and 15 feet of counter-shafting driving. one 3-spindle shaper; three Barnes 20-inch drill press; one New Yankee drill grinder; one emery wheel; two 24-inch drill presses, and one blower for grindstones.
1	10	1,120	Belted to one 30-inch single surfacer, self feed.
1	5	1,120	Belted to 12-inch rip saw. Self feed.
1	10	850	Belted to one National Blower Works 60-inch exhaust fan.
1	3	1,700	Belted to 16-inch R. & H. jointer.
1	7.5	1,700	Belted to Collady 7-inch head sticker.
1	3	1,700	Belted to 16-inch swing cut-off saw.
1	7.5	1,700	Belted to Atlas Machine Company continuous jointer, self feed.
1	15	1,700	Belted to Borg & Beck stave machine. This machine makes the staves out of which the barrels of the washing machine are constructed. The feed operation is like that of a continuous jointer.
1	7.5	1,120	Belted to 50-foot shaft, driving one barrel-hooping machine; one grindstone, 36-inch diameter; one barrel-polishing machine; one hoop bender, roll 8-inch diameter, 12 inches long; one flare machine, for flaring hoops; one hoop punch and webber. These hoops are put on barrels approximately 20, 23, and 36-inch diameter, 1-inch wide. The hoop bender makes the hoop conform to sloping side of barrel and punch and wetter fasten the two ends together completing the loop.
1	3	1,120	Belted to band saws.
1	5	1,700	Belted to Bordesman & Egan single surfacer.
1	3	1,220	Belted to one combination cut-off and rip saw.
1	3	1,120	Belted to one self feed 8-inch cut-off saw.
1	3	1,700	Belted to one 8-inch cut-off saw, friction feed.
1	7.5	1,700	Belted to line shafting driving four boring machines; two 6-inch wood lathes; one block saw, cuts out circular blocks; one scroll saw; one screw-driving machine; and one 8-inch circular saw.
1	2	1,700	Belted to one circular saw.
1	5	1,120	Driving 4,000-pound freight elevator.
1	5	1,120	Belted to heading cutter or bottom circler. This is a saw cutting circular bottoms of washing machines out of square boards.
1	5	1,700	Belted to two-drum 30-inch sander
1	3	1,120	Belted to shafting driving one emery wheel; one double emery wheel; one 8-inch disk grinder; and one band-saw file.
1	5	1,700	Driving elevator in dry kiln.
1	5	1,700	Belted to Chicago No. 20, two-spindle shaper, and 12-inch saw.
1	3	1,120	Belted to 12-inch cut-off saw.
1	3	1,120	Belted to line shaft driving one 16-inch drill press; one 12-inch engine lathe; one 6-inch shaper; one Garvin miller; and one small polishing and buffing stand.
1	2	1,120	Belted to shafting driving one 16-inch drill press; one double emery wheel; and one drill on flexible shaft.
1	1	1,700	Belted to one small conveyor for barrels. This takes the washing barrels from cooper shop on first floor to assembly shop on second floor where mechanism is put in.

Electric Sign in Warren.

The Turnbull Public Service Company is installing a sign 35 feet high over the Electric Building, in Warren, O., reading from both sides, "Do It Electrically, T. P. S." In all there will be 1,200 lamps.

Los Angeles Power Cut Off.

On January 6 a fire in the Vernon substation of the Pacific Light & Power Corporation interrupted the power supply to Los Angeles. As street cars, as well as lighting, are supplied over this line, there was a serious interruption to traffic.

Electric Sign Data

Getting the Most Out of Electric Signs.

We present herewith the second suggestion for an electric sign that may be used by central-station and sign salesmen in interesting prospects. The tendency of the times in all progressive communities is to advertise the advantages of such communities in a way that compares favorably with the most advanced commercial publicity methods. In this connection, an ever-increasing number of cities are selecting suitable slogans and advertising these slogans by means of electric signs. Durham, N. C., is one of the recent converts to this list of cities and the slogan sign selected in this case has received favorable comment from all sections of the country.

An interesting commentary on electric advertising by D. L. Gibbs is appended herewith: "Electric sign advertising, of course, includes a marvelously wide field of activity. We can scarcely realize that what we now regard as feeble and ineffectual attempts to catch the eye with the little incandescent lamp were once samples of marvelous advancement in electric business-getting.

"I think we are quite likely to narrow the field of advertising by electric lights, to signs with reading on them or with some peculiar flashing design, but as a matter of fact, everywhere a light glows we can find a call. The little light that burns over the doctor's or the undertaker's doorbell, the red lights burning in the theatres or the convention halls over the word 'Exit' and some other red lights, in drug stores, in front of police stations, over first-alarm boxes and elsewhere, all carry a message.

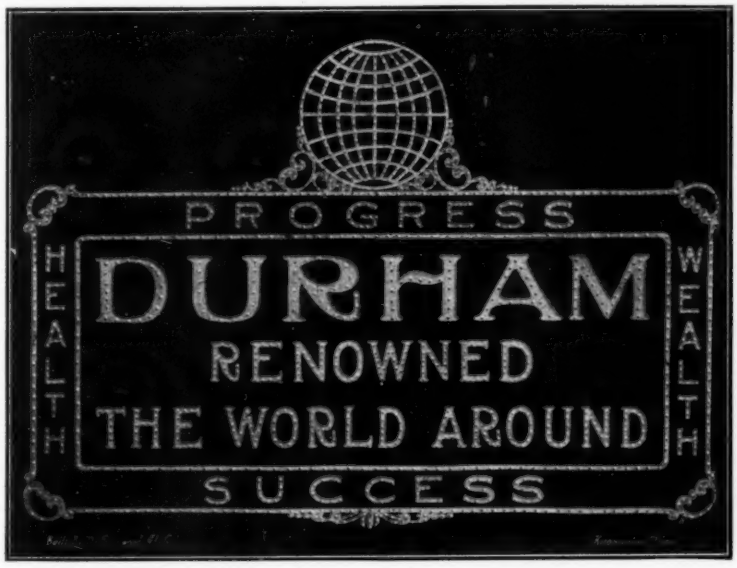
"I have no actual figures upon which to base my deductions. I have not been able to check my theories with so-called 'results,' but I believe that at least one form of advertising-value of electric signs, is that in geometrical progression, is as the cost of construction, the sign increases; that is, power to attract attention. That means that a sign costing $10 may be expected to attract the attention of 40 people in a given time, while one costing $100 may be expected to attract the attention of 1,600 people. This assumption, of course, is made with the understanding that both signs are displayed in localities frequented by a sufficient number of people to make the comparison fair.

"This does not mean, however, that the forty people in one case and the 1,600 in the other are attracted with sufficient power to bring sales, but is simply my idea of what such signs can do in catching the eye. A man may easily be attracted by the light or the design of a sign and not carry the impression away with him of what the sign is for.

I do not believe that a sign costing $10, put in a locality that is large enough to make a $100 sign effective, will have much, if any, commercial influence. It might possibly attract the commercialized attention of one person. The $100 sign, however, may be reasonably expected to exert a commercialized influence over at least ten people."

Attention is again called to the necessity in the electric sign field for such data as we present herewith. There will be published in this section each week a sketch or photograph of some original or noteworthy sign that may be used in interesting prospects in a similar line. Data will be given regarding the equipment of the sign, color and flashing effects and approximate first cost.

As shown, these data together with illustration will be published as a data sheet of standard size that can be cut from the page if desired.



Electric slogan sign built for the City of Durham, N. C., by the Greenwood Advertising Company, Knoxville, Tenn. Ordered by Henry L. Doherty & Company, of New York, managers of the Durham utilities, and presented to the city.

The sign is 50 feet high and 40 feet wide. The letters vary from 20 inches to 4 feet in height. There are 1,200 lamps used.

Flasher effect comprises the turning of the "world" on its axis continuously. The borders of the sign have shimmering or scintillating effect. The words flash on one at a time, completing the story of Durham's fame.

The color effects are as follows: the world is outlined in red; outside border and scrolls are all in green; the inner border is amber; letters between the two borders in red and inner letters in white.

Betts & Betts flashers and color caps are used.

The sign was shipped complete the eleventh day after the order was received.

Price will be given on request.

Electrical Construction

THE RELATION OF THE CONSULTING ENGINEER TO THE CONTRACTOR.[1]

By F. A. Vaughn.

In considering the relation of the consulting engineer to the contractor, the element that "looms up" larger and more prominently than any other is that described by the magical, justly popular and perhaps much abused word "co-operation." While there may be pleasant business, technical and social relations between the contractor and the engineer, the most essential relation by far is that of co-operation in the common service for the benefit of the customer of the contractor and the client of the engineer—of co-operation in order to secure for the individual who pays for the services of both contractor and engineer an installation of which all three may be justly proud.

You will, I believe, agree with the above analysis when I recall to your mind the many important advantages that accrue, not to the customer alone, but to the contractor as well, by the type of co-operation referred to above. Every one of you would undoubtedly rather do good work than slovenly; rather use good material than poor; rather put in a complete and thorough installation in which you can take pride as well as make a profit, than to put in one in which you can only make a profit; you would also rather work against fair and equal competition than be subject to rash and unreasonable competition from irresponsible concerns.

With the above assumed premises established, the way is opened to the proper relation of the engineer to the contractor.

Every consulting engineer who is worthy of his profession, naturally sets himself an ideal and a code of ethics that will build for him a reputation which will command the confidence of his clients in whose interests his efforts must be used in the broadest sense. He therefore must, by experience and other educational means, fit himself to know, for any particular client's installation and condition, what are the best and most dependable materials and methods. By specifying these in detail, the engineer will put all contractors on an equal basis, because they know in detail what is expected; will eliminate the possibility of "skimping," as well as the necessity for "playing safe" by excessive bidding to cover ambiguous points; will compel and popularize the use of good material and high-grade workmanship because of its merits; will demonstrate, as a disinterested adviser to his client, the advantages and economies of good work, thereby establishing the proper relation between just compensation to the contractor and good value to the client; and will in general establish higher standards, the general adoption of which will eliminate the demand for cheap materials and cheap labor and by the establishment of these conditions will be establishing what is best for the client, the contractor and the engineer. This, then, is the co-operative part which the engineer should play in this triple relation. The contractor can do his share in the co-operation by giving the engineer the benefit of his experience and his conscientious efforts to comply with the specifications, to the end that the installation is praiseworthy and the client is satisfied that the money he has paid to both the engineer and the contractor is well invested.

By co-operation such as above described, the quality of engineering installation in the community will be raised and good workmanship will be at a premium, as it should be; and this will all be accomplished without the efforts of the contractor, except, of course, the necessary and legitimate effort of doing good work according to specifications. Without the engineer in the field, clients are apt to ask and expect a contractor to "engineer" his installation, as well as to construct it, thereby forcing the contractor to labor, worry and expense that he probably is not willing to do, organized to do or paid to do. His function is to construct, according to the requirements of the client as expressed through the specifications of the engineer, just as the engineer's function is to plan and specify, but not to construct.

It may be suggested that the engineer is an unnecessary factor because there is usually an architect connected with the work who is, or should be, able to specify all of the engineering features of an installation as well as the structural, architectural and artistic ones.

It is believed a little consideration will show that, in these days of wonderfully intricate, complete, comprehensive and often elaborate buildings which an architect is called upon to construct, and the tremendous strides and rapid advancements of all branches of applied sciences or engineering, an architect who devotes much of his time or energy to keeping sufficiently in touch with the engineering features of his installation is sacrificing the architectural side of his work, which is the channel along which his very best efforts should progress, or else he is not devoting enough time and ability to master the engineering side; for the engineering branches involved in a modern installation—electrical engineering, mechanical engineering, heating and ventilating engineering, illuminating engineering, etc., are highly technical and specialized branches which require different talents, character of mentality and foundations, than those found generally in men naturally equipped to be architects.

So in this co-operative scheme it is necessary to include the architect, and the same spirit of helpfulness for a common good should prevail throughout. The requirements of the client can now be thoroughly, intelligently and accurately specified in detail so as to insure a thorough understanding of them by the contractor without the necessity of imposing on his time or abilities; and it should be noted that the more minutely the specifications are written, the better insurance the contractor has that any competing concern will be required to furnish exactly what he himself has figured and the more assurance there is of equivalency of purpose and intention.

Specifications which do not specify are like laws which do not carry with them their own interpretation—they require the interpretation of the courts or other authority before they are really valuable. An architectural specification asking tersely for a "home to house a family of four" would appeal to all of us as highly inadequate and ridiculous; yet it is hardly more inadequate than an engineering specification for an "A. C., 220-volt generator of 250-kw. capacity" although it

1 An address delivered before the eleventh annual meeting of the Electrical Contractors' Association of Wisconsin.

is believed the latter example is no exaggeration. In either case the client would get something which would perform the function he desired, in a way, but how satisfactorily is entirely unknown and indeterminate.

Brevity and terseness are much-to-be-desired characteristics of any composition written or spoken: but unfortunately it is usually impossible, in a matter involving so many details as an electrical installation, to state those details in such a definite and exact way that there can be no uncertainty as to what is required, and yet make that statement a brief one. The only safe way, therefore, to secure what is required is for the engineer or architect to specify minutely all details of the installation, even though to do so involves great trouble and expense. By such exact and complete specifications, not only is the client assured of getting the best installation for the money expended, but the contractor is protected against unscrupulous persons bidding for and probably securing the contract for the work.

A consulting engineer is therefore to be regarded as a co-worker, in the truest sense of that word, with the contractor. The whole influence of any consulting engineer who measures up to his profession is in the direction, first, of protecting the reliable and high-grade contractor from unfair and cut-throat competition; and second, to educate the client to the wisdom of putting in a first-class installation, thereby enabling the contractor to get a fair profit for first-class work. A more general recognition of this ground of common interest between the contractor and the consulting engineer would do not little to improve the conditions in the contracting field.

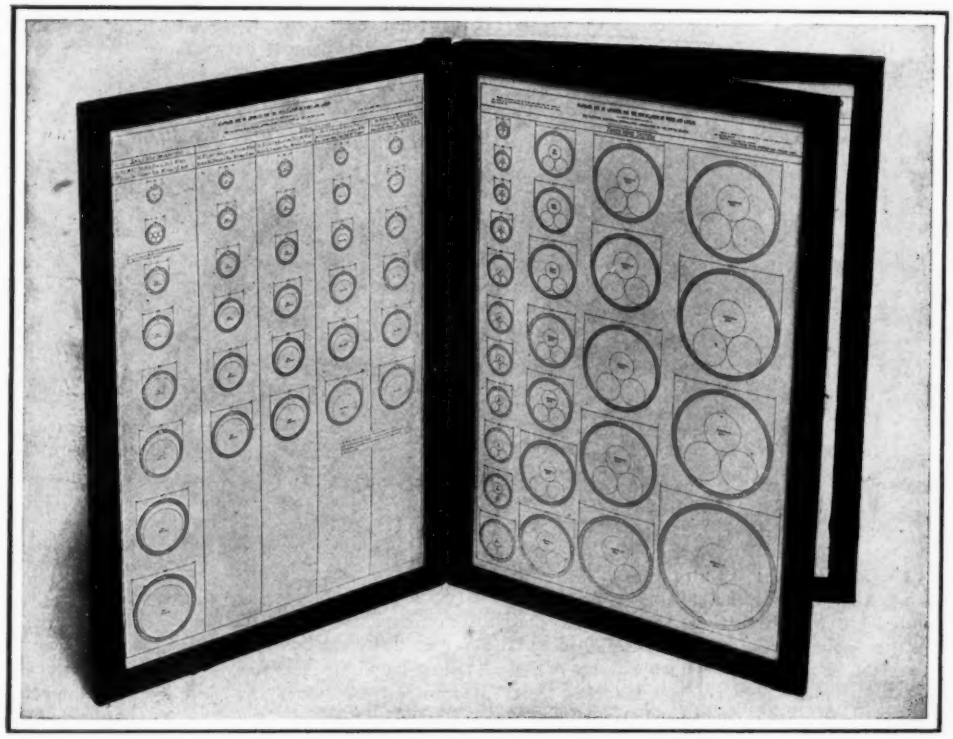
Conduit and Wire Charts.

The National Electrical Contractors' Association has revised the charts illustrating the sizes of conduit to be used for different sizes of wires and cables. A new set of six charts has been prepared, giving accurate data with reference to the proper size of conduit to be used for any particular installation. These charts have been prepared after careful study of actual working conditions and have been officially adopted by the National Electrical Contractors' Association as standard.

The charts, which are shown in the illustration herewith, represent the conduits and conductors, full size. They show the size of conduit needed for each combination of wires and also the actual external diameter of the conduit and the carrying capacity of wires of different size. These are in accordance with the National Electrical Code for 1913.

The charts are substantially framed in wooden frames hinged together and provided with a backing board for convenience in hanging. There are three frames in the complete set, two charts being mounted in each frame. The charts will be of value not only to the electrical contractor, but to the architect and engineer. They have been prepared by the National Electrical Contractors' Association for the purpose of standardization, and architects and engineers will find it sufficient to write into their specifications that conduit shall conform to the N. E. C. A. standard. The Association is supplying the charts at cost, which is $3.00, f. o. b., Utica, N. Y.

The secretary of the Association is George H. Duffield, 41 Martin Building, Utica, N. Y.



Conduit and Wire Charts Prepared By National Electrical Contractors' Association.

MIDWINTER MEETING OF ILLINOIS CONTRACTORS.

Illinois State Association Has Successful Gathering at Springfield.

The semi-annual meeting of the Electrical Contractors' Association of the State of Illinois was held at the New Hotel Leland, Springfield, on January 16 and 17, and was pronounced one of the most successful yet held by that organization. The total registration was 104, of whom 67 were members.

The opening session was called to order on Friday at 11 a. m., by President W. J. Ball. In the absence of the mayor of Springfield, who had been expected to make an address of welcome, this was done by H. A. Zinn, of the Ecco Engineering Company. The meeting was opened for general discussion and the representatives of jobbing houses and manufacturers were called upon. The following responded: G. A. Lundberry, of the Western Electric Company; Gus Harter, of the Harter Manufacturing Company; C. W. Beach, of the Adams-Bagnall Company; I. A. Bennett; T. Ensley, of the Diamond Electric Company; E. E. Rines, of the Federal Electric Company; V. A. Sweet, of the Inland Electric Company; E. H. Joseph, of the Electric Appliance Company; W. F. Hruby, of the Simplex Wire & Cable Company; J. E. Cather,

of the Manhattan Electrical Supply Company; W. P. Clawson, of the Edison Storage Battery Company; T. E. Hughes, of the Monarch Electric Company.

Mr. Lundberry stated that his company believed in a differential between the contractor and the consumer and was ready for any proposition along this line. Mr. Harter also favored such a difference between the jobber and the contractor. It should not be possible for the consumer to buy material at a lower price than that at which it can be secured by the contractor. Mr. Bennett, like Mr. Harter, favored three prices for the three classes of purchasers. He considered that both the jobber and the contractor are entitled to a profit in handling their goods. Mr. Ensley stated that his company is offering protection to the contractor by refusing to step over his head and sell to consumers at the contractor's price. He favored the Association's policy of holding contractors to a profit on every job. Mr. Beach called attention to the fact that although his company had discontinued its Chicago office, it still carried stock in a store room at that point.

Mr. Swett stated that there were three kinds of contractors: (1) the one who wants the best, (2) the one who wants the cheapest, and (3) the one who does not know what he wants. The first class is the easiest to sell to, and the second is the hardest. The third is learning by coming into the contractors' association.

Ernest Freeman, president of the National Electrical Contractors' Association, was then called upon and pointed out that both that Association and the Society for Electrical Development stand for the same purpose—co-operation. The Contractors' Association was formed for the purpose of helping each other and furthering the business, while the Society for Electrical Development had as its first object to make more business. He considered it advisable for every contractor to join this society, which works disinterestedly as regards the different elements in the electrical business. Where there are differences between these elements it will study them and try to adjust them, so as to avoid friction. Unless all engaged in the business participate in association work, it is harder to accomplish good results.

President Ball pointed to the large membership already attained by the Society for Electrical Development and said he considered it poor advertising for any contractor to stay out of it. He then called upon H. T. Schmidt, of Davenport, Iowa, who announced that the Iowa contractors would hold a meeting on February 2 at Waterloo, Iowa, for the purpose of organizing a state association. He invited all of the Illinois men to attend and give the new association the benefit of their experience.

W. J. Collins pointed out that all branches of the electrical business had grown up in a single generation. At first all of these branches were under one head but with the growth of business a number of units have branched out, which are represented by the supply men, contractors, manufacturers and central stations. Each of these prospers best under conditions which mean success for the others. Electrical work represents only a few per cent of the total cost of a building, so that the difference in cost between good and poor construction is a small matter to the owner, who often leaves the choice of material to the contractor. The manufacturer and supply man should cater to the contractor, who often determines also the extent of the installation. It is to the interest of the central station to co-operate with him also. All four elements constitute one big chain and every link in it should be kept strong.

R. Haas expressed his faith in the State Asociation and pointed out what had been accomplished by a similar association of plumbers. In that trade manufacturers and jobbers will not sell except to the legitimate plumber who has passed an examination and has his license and an established place of business. Where there are local associations of plumbers they will sell only to members of such associations. There is no good basis for selling to the consumer directly and there should not be in the electrical business.

E. J. Burns, who is secretary of a local association covering Rock Island, Moline, East Moline and Davenport, pointed out that the co-operation of the members is bringing about good results. He had participated in the campaign to organize the state of Iowa and stated that out of 25 letters sent to prominent Iowa contractors, 18 had responded affirmatively.

Alex. M. Knauber, president of the Faraday Electrical Association, said that the electrical contractor had been regarded as the lowest rung of the ladder among the building trades by the architects and builders. He has been buffetted around a great deal but has reached the point of resenting it. In Chicago the local organization of contractors is changing the former attitude. The manufacturer and jobber too have regarded the contractor as an unimportant element in the industry and they had been going ahead to do business regardless of him. Now the contractors are taking things in their own hands and they will effect a change in this attitude. They are now collecting data on the subject of relations with the jobbers and manufacturers, and want the latter to co-operate with them. If they will not do so, and continue selling direct to the consumer, the contractor will try to force them to take a different course. This is harder in the big cities like Chicago than in the smaller places.

The session then adjourned.

The meeting on Saturday morning was called to order at 10:10 a. m., with President Ball in the chair. Representatives of the electrical journals were first called upon. M. G. Lloyd, of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, spoke of the importance of organization and of the value to the contractor of belonging not only to the local, state and national contractors' associations, but also to such associations as the Society for Electrical Development and the Illuminating Engineering Society.

L. D. Spake, of the *Electrical World*, favored co-operation and affiliation with the Society for Electrical Development.

W. P. Clawson then called attention to the field for home-lighting outfits in the rural districts. He pointed out that there is a big demand for this class of apparatus, which at present is being filled largely through other lines of trade; whereas, the electrical contractor should take hold of it and make it his own field. He gave evidence of the opportunities along this line and then gave a brief description of the Edison storage battery and the work which it will do.

J. E. Latta, of the Underwriters' Laboratories, then made an address favoring the use of high-grade material. He explained the method of revision of the National Electrical Code and the change in the specification for rubber-covered wire, which has been made in 1911, and gone into effect the following year in all places where there was good inspection. In many towns, however, where there is no regular inspection, old-Code wire is being used, and what is worse, wire is in some places being used which does not even come up to the old-Code specifications. He deplored this condition and appealed to the contractors to stand for the best quality of materials as well as of workmanship. He pointed out instances which illustrated that it paid the contractor to do this if he handled the matter in the right way. He also explained the operations of the Underwriters' Laboratories and their relation to the work of the contractor.

Brief remarks were also made by P. J. Cratty, of the Weber Electric Company; T. A. Brooke, of the Illinois

Electric Company; B. J. Mockenhaupt, of the William P. Crockett Company; and C. W. Wilkins, of the National Carbon Company.

State License.

A discussion of the question of a state license for electrical contractors followed. C. R. Kreider stated that efforts had been made for 10 years past to get such a bill through the state legislature, but without results. There are only a few states which have such laws, but there are many cities in the country which have local registration. Minnesota has a law applying only to large cities, of which there are three in the state. Opposition has been based largely upon the grounds that it prevents temporary employment of those who might otherwise be thus engaged, and that it was against the interests of organized labor. It has been thought that the contractor was aiming to restrict his field and create conditions similar to a trust. He considered that workmen as well as their employers should qualify and that a license should be based upon the ability to comply with the necessary qualifications. The conditions should be the same as in plumbing, where a license is good at any point within the state and the collection of local fees for registration was excluded. In order to accomplish anything in the way of legislation he thought it was necessary to have a man representing the interests of the contractors constantly on the ground at Springfield while the Legislature was in session. In answer to a question as to whether any method had been worked out for enforcing compliance with a state license law in small places, he stated that violation is made a misdemeanor but that there is no state official whose business it is to enforce the law. This must depend upon the licensed contractors in any town calling attention to violations of the law. It has been attempted to incorporate the National Electrical Code in a bill, but this had not been found feasible.

R. C. Bierdemann thought the Association should go on record as favoring a state license, so that the jobbers and manufacturers would know their attitude and during their travels over the state could inform other contractors of the conditions.

John Mueller, Jr., inquired as to what points a state license should cover. He did not consider it a trust of association members but thought that a law of that kind should require an examination to show fitness for the work and should involve a fee which would merely be sufficient to cover the expenses of examination and enforcement of the law. Regulations for wiring could be put into effect by empowering the state fire marshal to issue a code and he could stipulate the National Electrical Code. He should have power to revoke a license if the work were found not to come up to the standard thus established. Each contractor should take the matter up with the representative from his own district in the State Legislature. He had done this personally and felt confident that they would have support from the representative from his district.

R. W. Poelma thought the members of the Association should first agree upon what they want and then work for it.

A. M. Knauber expressed the same sentiment and thought they should consider not only what was for their own best interests but also what other interests might be affected by the provisions of the bill, and find out what its effects would be. If such other interests were considered and protected they could probably secure co-operation in pushing the bill. The fire-insurance interests, for example, should be enlisted in the movement.

W. J. Collins pointed out that the interests of the electrical jobbers was the same as that of the contractor, as their business would be facilitated if there were a smaller number of contractors with fixed places of business and greater responsibility. Such conditions would make collections more sure.

Ernest Freeman thought all contractors would favor a license and made a motion that the Association go on record as favoring a license law covering the installation of electrical wiring and apparatus. This motion was passed.

C. R. Kreider pointed out that the masons had recently gotten a license law which required an examination for mason contractors and a fee of $100.

Banquet of Illinois Electrical Contractors, Springfield, January 17.

Local Associations.

The discussion then turned to the question of local associations and Mr. Knauber made an address pointing out the advantages of local associations, which permitted their members to get acquainted and work together for common ends. The idea that a competitor is an enemy should be dropped. The members should take home with them a copy of the Chicago registration ordinance and work for a similar provision in their home towns. This movement will educate the people of the State up to a state license law. De-

structive competition should be eliminated and competition based not upon price but upon quality of work.

W. J. Collins read a written communication dealing with the difference in conditions in different places. Usually the supply of contractors exceeds the demand, resulting in bargain sales or going down and out. Contractors should stop knocking each other and should co-operate and work harmoniously. Competition is often the destruction of trade, because it is so often unfair.

William McGuineas regarded a competitor as a financial enemy. Competition is the life of trade but the death of the trader. Uncontrolled competition is not a basis for any industry. It has been claimed that competition is the only condition resulting in honesty, but he thought that the opposite was true and that competitive conditions necessitated dishonesty in business. The organization should strive for the least competitive condition.

Central-Station Co-operation.

The discussion of central-station co-operation was then taken up and J. C. Marron opened the discussion. Contractors have often regarded the central station as a competitor, but he had found that they were usually ready to co-operate and would meet the contractor more than half way if the contractor would do his part. Contractors usually have been too busy to attend to this matter. It should be appreciated that the interests of the contractor and the central station are mutual. The contractor has been too ready to criticize the central station without taking up matters directly with them and showing the central-station man where they could work together. The central station on the other hand does not realize how much load the contractor obtains for it by the solicitation of business and the installation work which he does. The day for competition is over—co-operation is the thing.

W. J. Collins told of what had been accomplished in Chicago by co-operation with the Commonwealth Edison Company. A wiring plan for old houses, involving a plan for payments extended over two years, has been accomplished, financing of which is undertaken by the central station, which is also supplying the advertising matter. A schedule of prices has been fixed by the central station to which its own solicitors adhere. The contractors have found that they can adopt this schedule with profit to themselves. Many property owners bear no love for the central station and prefer to give the work to a contractor if he offers the same prices. Many customers also prefer to pay cash, but where they wish to pay in installments the central station pays the bill and makes collections when billing the customer for current. The contractors had to do some work to get this arrangement adopted, but he attributed it largely to the organization of the Society for Electrical Development.

John Hughes had previously worked with a central-station company as an employee and realized that contractors often complain against the central station unjustly. If they would endeavor to work harmoniously and would take up any matters of dissatisfaction directly with the central station, conditions would be much better. He saw no particular harm to the contractor when the central station cut prices on current-consuming devices, as he had found in Champaign that they sold just as many irons as before the central-station campaign on this article. He found the wiring of old houses more profitable than jobs on new buildings, as a better price could be secured, and he had been working in co-operation with the public service companies along this line with an arrangement for time payment similar to that adopted in Chicago.

Liability Insurance.

Liability insurance was the next subject taken up, and W. J. Collins made the principal address. He pointed out that the law now required employers to carry liability insurance of one kind or another and he gave figures which he had collected in regard to rates and the amounts of premiums paid by electrical contractors. Formerly the rate had been $2.10 but it had been brought down to $1.25 by securing a separate rating for employers of this class. He had found that among 37 contractors paying at a rate of $1.50, the company's losses had amounted to only seven per cent of the premiums. It was thus evident that after allowing for expenses the rate should be cut at least in half. The matter of mutual insurance had been considered and it was generally regarded necessary to have a combined pay roll amounting to $1,500,000 to make mutual insurance feasible. Single companies having a pay roll larger than this usually carry their own insurance. He favored a state mutual association for electrical contractors, in case better terms could not be secured from the existing companies. The combined pay roll of the contractors was about $4,000,000 and he thought that they could operate at a cost not exceeding 60 cents per $100 of pay roll. He thought existing companies would make a rate of 90 cents or better rather than lose the business.

A. M. Knauber corroborated this, as a 90-cent rate had been promised and he thought an even better one could be secured.

Upon motion of J. C. Marron a committee was appointed to consider the feasibility of organizing a mutual association with power to negotiate with existing insurance companies for a rate for the electrical contractors of the state.

Frank E. Valentine, of The Inter-Insurers Exchange, then made an address pointing out the good features of inter-insurance, which has all of the advantages of a mutual association but at the same time limits the individual liability of the members. He pointed out that the rates of the stock liability-insurance companies had been enormously increased upon passage of the workmen's compensation act. In most mutual companies the payments were limited and the assessments were uncertain. Under his scheme the assessments are limited.

The session then adjourned.

Closed sessions were held on Friday afternoon and Saturday afternoon, at which among other things there were reports of committees and discussions on the relations with jobbers and with central stations. The question of a state license for electrical contractors was also further considered. It was decided to hold the next meeting of the Association in Danville on June 19 and 20.

On Friday evening there was a theater party. On Saturday afternoon the members and guests were taken in a special car to the works of the Sangamo Electric Company, which were inspected.

On Saturday evening there was a banquet and dance at the Leland Hotel. An address was made by G. A. Northcot, former lieutenant-governor of the State.

President Ball announced the appointment of the following committees. On Local Organization: W. J. Collins, John Hughes, C. E. Stapp, W. J. Burns and R. A. McLaughlin.

On Central-Station Co-operation: A. M. Knauber, W. J. Collins, E. F. Pendergast, William McGuineas, F. E. Bolte.

On Liability Insurance: C. R. Kreider, J. C. Marron, W. J. Collins, John Mueller, Jr., E. J. Burns.

The Boosters Committee and the Educational Committee were continued.

City Electrician Wanted.

Examinations for the position of city electrician will be held by the Civil Service Commission of Cleveland, O., January 28. The place is now held by Maurice Sarbinsky, who will become secretary to Director of Public Utilities Stage.

National Association of Electrical Inspectors.

THOMAS HENRY DAY, president, 59 Deerfield Street, Hartford, Conn.
H. S. WYNKOOP, vice-president, 13 Park Row, New York, N. Y.
WILLIAM LINCOLN SMITH, secretary and treasurer, Concord, Mass.
JAMES E. COLE, Representative on Electrical Committee of National Fire Protection Association, 11 Wareham Street, Boston, Mass.
J. E. LATTA, assistant secretary.

Executive Committee

EUGENE N. DAVIS, chairman, Brookline, Mass.

Frank R. Daniel, R. P. Strong, Henry A. Knight, C. H. Fletcher, Washington Devereux, James B. McCarthy, James H. Fenton, R. J. Forsyth, C. W. Mitchell, A. W. Hopkins, G. W. Perry, George L. Collison, T. H. Fritts, A. H. Soper, T. W. Bowry, F. G. Hartwell, A. A. Moffitt, Thomas D. McColl

Secretary's Message.

The Secretary has very little matter to bring before the Association at this time, as owing to the press of work during the holiday season the members have apparently been too busy to supply him with any large amount of information and no questions.

The regular monthly meeting of the Eastern Massachusetts Section was held January 15 at the office of the Commissioner of Wires of Boston. About twelve were present, it being a very unpleasant day and transportation to and from the city being seriously interfered with by the destruction by fire of one of the signal towers in the Boston and Maine terminal yard.

The members of the Western New England Section are looking forward to their next meeting which comes on February 8, at New Haven, the home of the chairman of their Executive Committee, when a visit will be made to the Sheffield Scientific School.

In regard to the questions appearing below there is little to be said; questions 251 and 252 bring up the vexed question of domestic heating devices. The Code requirements are plain enough on the subject, except in one regard, which is indicated in one of the answers to question 251. The difficulty is to see that they are lived up to. We may inspect and rate and fuse circuits just as long as we please, and so long as heating devices of varying size are made and arranged so they can be plugged into the ordinary socket, receptacle or baseboard outlet they will be so inserted regardless of what we do; neither could a force of inspectors comparable with the police force in one of our large cities prevent it.

You cannot prevent a person, frequently a seamstress or maid, but not infrequently the mistress herself, from putting a five-ampere, 125-volt iron into a 250-watt key socket, provided said socket is nearer to where she wants her ironing board, no matter how much you inspect. In conversation one of my inspector friends told me he went into the sales room of one of the largest light and power companies in the vicinity recently and speaking of this point to the salesman (not as an inspector but as a simple purchaser of an iron) got the reply from him that they didn't care about this matter at all, their business was to sell the goods and sell all they could. He said: "So and So wouldn't let any one use this thing in that way out in —— would he?" "Not if he knew it," was the reply, "but how in thunder is he going to find out?"

Now what can the inspector do with a considerable territory to cover when people talk that way? It is bad enough for the municipal officer with a comparatively small territory, and what can the insurance man do in his much wider territory?

In my own municipality we have pretty nearly exterminated the difficulty (our only source of power being a municipal plant) by giving a domestic heating and power rate of 3 cents per kilowatt-hour as against 9 cents for lighting, practically no charge for an additional meter, and in consequence there is a heavy inducement to have a special circuit run where any heating devices of any size are to be used.

It seems to me that the only way out of the difficulty is ultimately to get irons and similar portable heating devices fitted with attachment devices which will not fit the ordinary socket, or some similar arrangement (though how or what I confess I do not now see) and in the absence of this try whenever we have a chance to do a little *educating* ourselves. It is hard work but it means quite a bit of increase in peace of mind, as I can certify after several talks to local women's clubs, etc.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

Grounding on Water Pipes.

Question 249. When the water service to a building is a lead pipe, what is the best form for making the ground connection without melting the lead pipe through a poor connection to said pipe?

Answer 1 (S). An approved ground-clamp if properly installed, should make a good connection. I have seen good connections made by winding the pipe with a great many turns of small wire. No. 14, B. & S., will make a good job if properly applied. The connection should be soldered, if possible to do so.

Answer 2 (J). So far as possible we discourage the use of lead piping for a conduit ground. When permitted at all we require the connection to be made at a fitting of harder metal—not directly to the lead.

Answer 3 (F). If this question refers to the grounding of alternating-current secondary systems, see Rule 15, National Electrical Code. If to the grounding of interior conduits, see Rule 28*f*.

Answer 4 (Q). Use ground connector made of copper band with sufficient exposed to operate largest fuse without heating. The conductivity of

lead pipe should also be considered in case of larger fuses.

Answer 5 (V). There should be no danger with a proper ground clamp.

Answer 6 (P). There are a number of approved and satisfactory ground clamps, the use of which will obviate nearly all chance of melting a lead pipe through poor contact. See list of approved fittings.

Answer 7 (B). The rules call for an approved clamp, and it would seem as if a properly constructed clamp would give suitable connection if rightly installed. If conditions should arise where service pipe was such as would not permit of the use of a ground clamp, we would approve of wire wrapped around pipe and soldered in similar manner as a wiped joint on lead-covered cable.

Answer 8 (N). Make it if possible to the brass work of shut-off cock on street side, or by wrapped wire wiped like a joint, an ordinary friction ground clamp is very uncertain and should never be used if avoidable. Neither should a lead pipe ground anyway.

Answer 9 (I). In this city we use a standard ground clamp and we have little trouble from their working loose.

Answer 10 (Y). By the use of approved ground clamp or plug. See fine-print note, section 15*g*.

Answer 11 (M). The installation of several ground clamps would distribute the possible current over a large area and thus decrease heating offset. If possible to do so, it would be preferable to shunt the lead pipe with a wire at least as large as the ground wire.

Answer 12 (E). I feel a ground clamp on a lead pipe should be examined frequently, as they are apt to loosen. If possible it would be better to attach to clamp on the street side of main cock, which is generally brass.

Answer 13 (V). We would not allow a ground to lead pipe; would prefer a driven ground.

Answer 14 (D). Connect the ground wire with the brass fittings on the end of lead service, *or else provide some other source of ground.*

Answer 15 (O). Ground connection should not be made to a lead pipe under any circumstances.

Answer 16 (R). Lead water pipe is not considered as a good ground connection for a grounded secondary. In case of lead-pipe water services I should ground my secondaries outside of the building to a ground plate installed in an approved manner.

Cutouts For Heating Devices.

Question 250. Six heating devices (chocolate warmers in this case) of 264 watts rated capacity each, are found connected to single wiring circuit, no individual fuse cutouts having been provided. Does this conform to Code requirements? Is Rule 25a intended to require a switch and cutout for each heater, as Rule 81b requires them in the case of motors, or may any number of heaters be attached directly to a single circuit of sufficient capacity, fused only for the total connected load?

Answer 1 (W). It does if the fuse is not over 10 amperes. Each heater of more than 660 watts capacity must be protected by a cutout and switch. "Each" in Rule 25*a* means every one of a number taken separately; and is mandatory for a cutout and switch for each individual heater.

Answer 2 (D). Heating elements may be dependent upon one cutout where capacity does not exceed 660 watts.

Answer 3 (U). Six such heaters can be connected to a two-wire circuit without individual cutouts if circuit is not fused for more than 10 amperes.

Answer 4 (V). In this case *two heaters* could be under the protection of one cutout and controlled in pairs or singly as would best satisfy the conditions.

Answer 5 (O). Rule 25*a* is intended to require individual cutouts for any and all heaters of 6 amperes capacity or over. The point is further covered by Rule 23*d*, first paragraph.

Answer 6 (Y). The six heaters should be grouped on two circuits, each circuit protected by fuses not larger than 10 amperes capacity.

The second part of the question is included in the above.

Answer 7 (R). It does not conform to the Code. Referring to Rule 25*a*, heaters of less than 660 watts capacity may be grouped together on one circuit provided the circuit is protected by fuses not larger than 10 amperes capacity.

Answer 8 (B). The six devices referred to are presumably for use on so-called 110-volt systems, although question does not specifically so state. On this supposition, each heater would take 2.4 amperes, or a total of 14.4 amperes for the six heaters, which it is plain would be a violation of Rule 25*a*, which permits the grouping of heaters of 660 watts or less under a single set of uses "provided the rated capacity of the fuses does not exceed ten amperes."

A separate cutout is required where heater is of more than six amperes or 660 watts capacity.

Answer 9 (N). The question is capable to two answers. I am informed by my corporation counsel that the legal reading of the second sentence of Rule 25*a*, can only be interpreted taken by itself to permit the grouping of any number of heaters whatever on a single circuit provided no one of the heaters is over 6 amperes or 660 watts capacity, and provided, further, the fuses are not of over ten amperes capacity. The wording apparently refers to individual unit size, but taken in connection with Rule 23*d*, in which the 660-watt requirement just as clearly refers to the group rating, it would quite possibly require a judicial decision to interpret the relation of the two clauses in case of controversy. We have therefore by municipal by-law forbidden the grouping of heaters totalling more than 660 watts to one cutout. The chance of using the 1,320-watt privilege of Rule 23*d*, paragraph 2, is eliminated because the heaters do have flexible cord attachments.

Answer 10 (E). This question rather suggests the lady who had a three-light fixture in her dining room. In one socket she had a chafing dish, in another a percolator and in the third a toaster, and she complained because there was no place to have a lamp. The condition expressed is not in accordance with Code requirements. Rule 25*a* does not require a switch and cutout for each electric heater, unless the electric heater is of more than six amperes or 660 watts capacity. It is not permissible to attach any number of heaters to a circuit any more than it is permissible to attach any number of lamps to a circuit. Should the combinded capacity of a group of electric heaters under the protection of one set of fuses, exceed ten amperes, then, in my judgment, the circuit should be divided that it may be within the rule.

Answer 11 (Q). Under Rule 25*a*, each heater of more than six amperes capacity must be protected by a cutout and controlled by indicating switch, single-pole, up to a capacity of 660 watts. When heater of greater

capacity is used, double-pole switches are used to comply with switch rules. Plug connections of sufficient capacity can also be used to make and break cords, these cords always being double-pole. When small heaters are used these could be grouped up to a 660-watt capacity controlled by a single-pole indicating switch or plug connectors used.

Answer 12 (H). The local conditions shall govern the installation referred to in this question. Assuming the voltage on the line to be 110, the apparatus requires 16 amperes. It does not conform to Code requirements.

Rule 25*a* is intended to require a switch and cutout for each heater, etc. If the heaters referred to are used in one place, they should be on two circuits and fused as if they were a sub-circuit for lighting; if they are scattered all over the building, they should be on a separate outlet.

Answer 13 (P). The six 264-watt heating devices cannot be connected to a single wiring circuit, for the reason that they exceed in total capacity 660 watts (see rule 25*a*). This rule says clearly that the heaters "may be grouped under the protection of a single set of fuses." It says further—and just as clearly—that the number of heaters which may be grouped under a single set of fuses is limited (1) by the provision that the group shall not exceed 660 watts capacity; and (2) that the total current shall not exceed ten amperes.

Answer 14 (S). Rule 25*a* allows heaters of six amperes or 660 watts capacity, or less, to be grouped under the protection of a single set of fuses, provided the rated capacity of the fuses does not exceed ten amperes. In the question the voltage is not mentioned. If these heaters were made for 110 volts and installed on a 110-volt circuit it would be impossible for a ten-ampere fuse to supply the current. In this case I should require the load divided between two circuits.

If they were made for 220 volts and installed on a 220-volt circuit they could be grouped under the protection of a ten-ampere fuse as allowed by the Code rules. Rule 25*a* does not mention the voltage when allowing the use of a ten-ampere fuse.

Answer 15 (X). Unless the normal working voltage of these heaters is given the question can not be answered. The code ruling on the connected load is by watts capacity and the grouping in parallel of heater appliances of less than 660 watts each is limited to a total connected load of 10 amperes fusing. On a 110-volt circuit these six heaters could not be connected in parallel on one circuit while at 220 volts they may.

Iron on Fixture Outlet.

Question 251. An iron of five-ampere rating is plugged into keyless (660-watt) socket on an ordinary lighting chandelier. This is wired throughout with No. 16 fixture wire and controlled by a single-pole five-ampere indicating wall switch and protected by a six-ampere plug fuse. Does this installation conform with Rule 25a or should the switch and cutout be arranged to take care of the heating device only?

Answer 1 (W). Yes, it conforms to Rule 25*a*, as wired.

Answer 2 (D). The installation as described would comply with Code requirements.

Answer 3 (U). Yes, this conforms with Code requirement of Rule 25a.

Answer 4 (V). If the number of lamps on this circuit does not bring the total wattage above 660, including the iron wattage, all may be on one cutout. Switch is not mandatory.

Answer 5 (O). The installation described is standard provided the total load on the branch circuit (including the iron) is not over 660 watts. Rule 25*a* has been revised especially to cover this point; see also Rule 23*d*.

Answer 6 (Y). The five-ampere heater should be approved on the lighting circuit as described.

Answer 7 (R). An iron with less than 660 watts capacity is not required to be protected by a separate cutout. See second sentence, Rule 25*a*.

Answer 8 (B). This would comply with present requirements of the Code.

Answer 9 (N). This is allowable according to the present Code rules, provided the number of outlets and total wattage are within the limit.

Answer 10 (E). Where the iron is within six amperes or 660 watts capacity, it is allowable under Rule 25*a* to install and use an iron in the method described.

Answer 11 (Q). This is not a violation of Rule 25, as the socket has the capacity rating and the smallest wire in the circuit is not overloaded. Would suggest, however, that the fuse be increased to take care of the starting current.

Answer 12 (H). I would not pass a heating iron plugged into a lighting chandelier under any circumstances, as there is no guarantee whatever that the five-ampere iron now in use would not be exchanged for one of ten or fifteen amperes rating. We insist upon separate outlets for electric irons in every case.

Answer 13 (P). Rule 25*a* does not require the arrangement of a switch and cutout for the five-ampere smoothing iron alone under the conditions cited.

Answer 14 (X). The installation conforms to Rule 25*a*.

Answer 15 (S). I think that Rule 25*a* is very plain on this subject. The voltage of this flat-iron is not given. If it were 110 volts we would have 550 watts, which would be allowed by the Code. If it were 220 volts we would have 1100 watts which would not be allowed. I do not recommend a connection of this kind. My advice to builders and owners is, to have a separate circuit and fuses for flat-irons.

Detroit Inspectors Elect Officers.

At the second annual meeting of the Electrical Inspectors' Club of Detroit, held on Wednesday evening, January 7, 1914, at the offices of the Electrical Inspection Department of the Public Lighting Commission, Detroit, Mich., the following officers were elected:

President, R. J. Dotson, chief inspector, Highland Park.

Vice-president, Lew Borer, chief inspector, Pontiac.

Secretary and treasurer, Harvey Boyd, electrical inspector, Detroit.

The retiring officers are: W. E. Flickinger, president; Ben W. Clark, vice-president; Edward Snow, secretary and treasurer.

The annual banquet and installation will take place on Wednesday eevning, February 4, 1914, at 8 p. m.

New York State Electrical Contractors Meet.

The fifteenth annual convention of the Electrical Contractors' Association of New York State was held January 20 in New York City. There was a large attendance from city and state, over 200 being present. The proceedings were private, but delegates and invited friends enjoyed a tea and reception in the afternoon and a theater party and smoker in the evening under the management of the Metropolitan Electrical Contractors' Association.

Public Service Commissions

ILLINOIS.

The State Public Utilities Commission has issued a general order directing every public utility in the state of Illinois to have on file with the Commission, not later than February 1, 1914, and keep open for public inspection, schedules showing all rates and other charges and classification which are now in force or which have been at any time in force since July 1, 1913, for any product or commodity furnished by it; or for any service performed by it.

KENTUCKY.

A public utilities bill has been introduced in the Legislature. Representative Myers presented the bill, which enlarges the powers of the State Railroad Commission, giving it control over the rates and regulation of public service corporations of all kinds.

MARYLAND.

Residents of Rognel Heights, a suburb of Baltimore, recently filed a petition with the Public Service Commission asking that the Consolidated Gas, Electric Light & Power Company be compelled to carry out a contract made between the town and the Patapsco Light & Manufacturing Company, which the Consolidated Company absorbed. By this contract the Patapsco Company agreed to furnish street lamps for the community without charge in return for certain privileges. The contract was made in October, 1910, a few months after the law creating the Public Service Commission became effective. A few weeks ago the Consolidated Company notified the town that the free street lamps would be discontinued. An opinion prepared by William C. Bruce, general counsel to the Public Service Commission, states that a public service corporation cannot lawfully accept any compensation other than money for its services, and the Commission cannot consequently require the company to continue the service. He concludes that the contract in question is repungent to the letter and spirit of the commission law and legally void.

Regulation of the hours of work for employees of public service corporations is not within the province of the Public Service Commission, unless it is shown that there was overwork such as to impair their efficiency and endanger the safety of the public. This opinion was prepared by Mr. Bruce in the case of employees of the power plant of the Hagerstown & Frederick Electric Railway Company. These employees complained to the Commission that they were compelled to work 12 hours a day and asked the Commission to shorten the working period. There is no law regulating the hours of work of power-plant employees. Before taking any action the Commission has given the railroad company 10 days in which to show the 12-hour working day does not impair the efficiency of its operators.

MASSACHUSETTS.

The Gas and Electric Light Commission has approved the issue of the Agawan Electric Company, Agawan, Mass., of 1,000 shares of new capital stock, par value $100, at $100 per share, the proceeds to be applied to the payment of notes outstanding November 30, 1913. On September 5, 1913, the Commission approved the issue of original capital stock to the amount of $25,000 for the purpose of acquiring the plant and property carried on by a local contractor. The Amherst Power Company has acquired control of the company and purposes to operate it solely as a local distributing company, the energy to be supplied to it by the Amherst Company. The latter company has constructed a high-tension transmission line and substation at Agawan at a cost of over $100,000, and this expenditure was assumed by the Agawan Company and was represented by its promissory notes of November 30 last, amounting to $128,074.

NEW JERSEY.

The Board of Public Commissioners has approved of an issue of $150,000 six-per-cent, five-year notes by the Commonwealth Water & Light Company, Morristown, with the provision that the company will immediately commence the separation of its various properties into individual corporations. The company, which recently acquired control of the Point Pleasant Electric Company, will consolidate such interests and its electric properties at Lakewood under the ownership of the Lakewood Electric Company; in this same section, the company will arrange its water and sewer properties under the control of the Lakewood Water Company. In the northern section of the State the company will similarly segregate its water and electric properties into one district water company and one electric company.

NEW YORK.

The Public Service Commission for the Second District has submitted to the Legislature its seventh report, covering the year 1913. In the report it recommends several amendments to the present law. It asks for authority, such as is now possessed by the Interstate Commerce Commission, to suspend for a period of four months advances in rates pending investigation as to their reasonableness. The report points out that the New York Telephone Company has been acquiring the property but not the franchises of independent competing companies. The Commission recommends a law prohibiting the acquisition by one company of the plant and property of another without the written consent of the Commission, as is now the case with respect to gas and electric-light corporations. It urges jurisdiction over all telegraph and telephone companies, no matter how small. During the year permission was given to 17 new corporations to furnish gas or electric service in the state. Inspections have been made of 265 telephone exchanges, and 95 telegraph offices. Appendices to the report contain statistical summaries and comparisons. These include the comparative cost of fuel for steam power used in generating electricity by different corporations and tables showing the amount of stocks outstanding and dividends declared during the year.

OKLAHOMA.

The constitutionality of the act passed by the Oklahoma Legislature on February 10, 1913, authorizing the Corporation Commission to collect and disburse to individuals entitled to the same any excess charges that may be found to have been collected by public service corporations, is upheld by the Oklahoma Supreme Court in affirming the action of the Commission in regard to the refund demanded from the Pioneer Telephone and Telegraph Company. The court holds that the Pioneer Company is demanding and collecting a rate for its telephones in Oklahoma City in excess of that fixed by the Corporation Commission by its order of October 12, 1908, and must refund to its subscribers the ex-

cess, which amounts to approximately $62,000.

The order of October 12, 1908, provided that a telephone company should not increase its rates in Oklahoma without first making application to the Commission and submitting schedule of the proposed changes for its approval. In July, 1909, the Burrows Company of Oklahoma City filed complaint against the Pioneer Company under that order. The company contended that it acted under authority of a city ordinance and that the Commission's order could not set aside its rights under that ordinance. After a hearing, however, it was adjudged in contempt. The case was appealed to the Supreme Court, which after several hearings affirmed the Commission's action.

Thereupon the State, through its attorneys, filed a petition with the Commission, seeking to recover the amount of the excess charges alleged to have been collected, being at that time $60,357.20. The company contested the action, but judgment was entered against it for the amount and the matter was taken to the Supreme Court. The company did not question the correctness of the Commission's figures but alleged that the act of February 10, 1913, was repugnant to both state and federal constitutions. Both contentions were decided against the company by the court, which declares that "if this conclusion is incorrect the regulation of public service corporations provided for in the constitution in many instances would neither be adequate or effective." The opinion was written by Justice Robert L. Williams, who was chairman of the Committee on Public Service Corporations in the constitutional convention and drafted many of the provisions of the Oklahoma constitution fixing the powers and duties of the Corporation Commission.

It is understood that the Pioneer Company will take the case into the federal courts, although no final announcement has yet been made in regard to that matter.

The Corporation Commission still has up for hearing the application of the Pioneer Company for a raise of rates from January 1, 1914, which has been delayed on account of the serious illness of one of the attorneys for the company. The company has given a supersedeas bond to guarantee payment of any excess charges from January 1 on, if its application for an increase in rates is not approved by the Commission. The $62,000 excess covers the period from October, 1908, to January, 1914.

The Purcell Telephone Company is preparing to make a refund to subscribers of excess charges collected under a raise in rates made in 1911 without authority from the Corporation Commission. The excess is 25 cents per month on residence and 50 cents on business telephones.

VERMONT.

Orders issued by state public utility commissions may be enjoined by the federal as well as the state courts, according to a decision handed down on January 19, at Washington, D. C., by the United States Supreme Court. The case was that of the Vermont Public Service Commission against the Rutland Railroad Company, the court deciding in favor of the latter.

The Vermont Commission ordered the railroad company to improve its station at Vergennes. The railroad immediately brought suit in the federal district court to restrain the Commission from enforcing the order on the ground it had exceeded its statutory powers.

The Commission moved to dismiss the injunction bill on the plea that the railroad should not have sought relief in the Federal court, but should have appealed from the order of the State Supreme Court in accordance with the provision of the Vermont public service law.

The federal court overruled this contention and enjoined the order. From this decision the Commission appealed to the Supreme Court.

The opinion, which was delivered by Justice Hughes, states that the law directing appeals to be taken from the order of the Commission to the State Supreme Court provides only "an alternative and more expedious way of doing what might be done by a bill in equity. Whether the alternative is exclusive or concurrent, whether it opens matters that would not be open upon a bill or not, if exceptions are taken, is immaterial; the remedy in any event is purely judicial: to exonerate the appellant from an order that exceeds the law. The railroad was free to assert its rights in the district court of the United States."

In the district court the Commission did not oppose the railroad contention that the Commission had exceeded its powers in issuing the order. In its brief in the Supreme Court the Commission intimated that if unsuccessful in establishing its contentions as to jurisdiction, it would seek additional legislation by the Vermont legislature.

WISCONSIN.

The use of silent-number telephones has received the stamp of approval in a decision recently issued by the Railroad Commission. The opinion followed a complaint by certain subscribers of the Wisconsin Telephone Company in Milwaukee alleging that the practice complained of was discriminatory and unfair.

The Commission has ordered the Milwaukee Electric Railway and Light Company and the Milwaukee Light, Heat and Traction Company to abandon their zone system of fares on urban and interurban lines and to substitute therefore a schedule of rates based upon distance. This will entail a reduction of approximately two-thirds of the single-way fares.

The Madison Gas and Electric Company has been ordered to give gas and electric service to a consumer to whom such service was refused for the reason that certain bills contracted at various places of residence were still owing to the company. It was held that where a consumer was willing to make the deposit required by the company to insure the payment of current bills under contract for future service, the company was required to furnish service notwithstanding the existence of bills previously incurred and unpaid. It was admitted that this might cause a hardship in a few cases but that it ought to have the effect of making the company more careful in the matter of its credits and in the enforcement of the deposit provision of its contracts.

Elihu Thomson Lectures on Wireless.

At the joint meeting of the New York Companies Section of the National Electric Light Association and the New York Electrical Society, held at the Edison Auditorium on Monday, January 19, Dr. Elihu Thomson delivered a lecture on "The Wireless Transmission of Electrical Signals." Dr. Thomson's lecture was illustrated with lantern slides and the large attendance, including a great many students of the New York Edison Company and such notables as John W. Lieb, Jr., Prof. M. I. Pupin, T. C. Martin, H. M. Edwards and W. J. Hammer, listened attentively and appreciatively. Among other things, Dr. Thomson stated that the General Electric Company had tried to establish wireless signaling between Lynn, Mass., and Schenectady, N. Y. The work was not very successful, the topographical condition of the intervening territory evidently interfering with transmission. Dr. Thomson stated, however, that a message got through occasionally, coming, perhaps, down the Hudson River and around by the water route via Cape Cod to Lynn.

National Electric Light Association Convention.

The annual convention of the National Electric Light Association will be held at the Bellevue-Stratford Hotel, Philadelphia, from June 1 to June 5. All committees are actively at work and an excellent program is assured. All sessions of the various sections and the exhibition features will be held at the hotel, and it is expected that there will be a very large attendance at this very important convention.

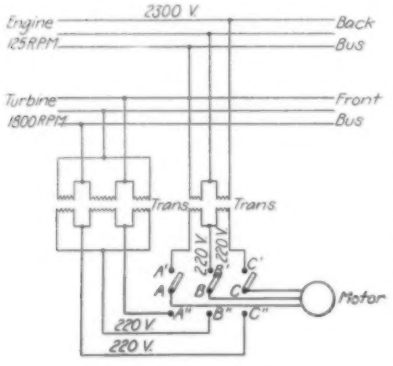
Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 193.—Repairs to Spark Coils.—Is there any way to remove the wax so as to permit making repairs on the coils of a jump spark coil box, such as used on automobiles, without spoiling the finish of the wood?—J. F. P., Canton, O.

No. 194.—Motor Circuit.—In operating a hot-well pump, we use a 220-volt



No. 194.—Motor Circuit Diagram.

three-phase motor, which derives its energy from a bank of three five-kilovolt-ampere transformers that are in turn fed from an outgoing power circuit. Any outside disturbance on this particular line would always drop the switch and consequently shut down the pump. In order to avoid this difficulty we used two transformers of 7.5-kilovolt-ampere capacity and which were fed from the back busbars, the leads being clamped to them. The secondary leads were run to the upper and lower terminals of a triple-pole double-throw knife switch, using the hinge terminals for the leads to the motor, as per diagram herewith. At the time of phasing out so as to keep direction of rotation the same, one turbine-driven generator was operating on the front buses, and an engine-driven generator on the back buses. In testing we used two 110-volt lamps in series and from terminal A' to A'' there was no light, from B' to B'' no light, and from C' to C'' no light, but from A' to C'' the two lamps burned dimly. We could not secure any light from any other connection. Thinking possibly that the dim burning of the lamps between A' and C'' was caused by the generators coming up to synchronism, we inserted the plugs, but they were nowhere near that point, as the lamps on the synchronoscope and the instrument itself plainly showed. I have tried this over a great many times with the same result, which I cannot account for. Can some of your readers explain it?—R. J. H., Mason City, Iowa.

No. 195.—Polyphase Meters.—Are any reliable polyphase watt-hour meters made with only one disk? Have they any advantages over the type with two disks on one spindle?—N. S. W., Peoria, Ill.

No. 196.—Speeding Up Street Cars.—If an electric street car designed for a maximum speed of 25 to 30 miles per hour is to be run part way in a rapid-transit subway at a speed of 40 to 45 miles per hour, can the motor and control equipment be readily adapted to the higher speed desired or must a motor equipment designed for the higher speed be substituted? Could this be accomplished satisfactorily by changing the ratio of the reduction gear?—B. F., Chicago, Ill.

No. 197.—Long-Distance Telephones.—In order to have satisfactory conversation over a very long telephone line, is it necessary that the telephones used at the ends of the line be of exactly the same make, or is it sufficient to have them of the same general type and built for long-distance service?—U. S. P., Cedar Rapids, Iowa.

Answers.

No. 183.—Purity Test for Sal Ammoniac.—I should like to know a simple but accurate way to test sal ammoniac. I find that considerable of this material being sold is adulterated with common salt or other cheap chemicals. The burning test is not accurate enough. I should like to be able to test about what percentage of the test sample is pure sal ammoniac and how much of it is adulterated.—F. H. W., Brooklyn, N. Y.

The chief impurities found in commercial ammonium chloride (sal ammoniac) are common salt, sulphates, fixed impurities, metallic impurities in general, and iron, in particular. Ammonium sulphocyanide and barium salts have been detected occasionally as a contamination of ammonium chloride. Before a quantitative test is made of a compound it is usual to determine just what it consists of. This is absolutely necessary where nothing is known about the compound. A complete qualitative test could be made, but, as the reader probably does not care to do any more than discover what the chief impurities are, and their amounts, it is sufficient to test qualitatively for the known chief impurities, and if found, to make a quantitative determination of them. We have noted the chief impurities above and will test for these only, with one exception, sodium, which the question states is introduced in the form of sodium chloride or common salt.

Sodium is always apparent to the naked eye by the flame test when this metal is present. It will often be found present in small quantities, even in so-called chemically pure salts. If the yellow burns off in about a quarter of a minute it is safe to report only a trace of sodium present. The flame test for sodium is extremely delicate; in fact, a millionth part of a milligram of sodium may be recognized by means of the spectroscope. Practically, sodium occurs so frequently and is so persistent that simply rubbing a clean test wire with the fingers once will transfer enough sodium compound to the wire to give a distinct yellow flame coloration. The ammonium sulphocyanide may be tested for as follows: extracting by digestion with hot alcohol and, after the evaporation of the alcohol, dissolving the residue in a small quantity of water, sulphocyanide will be recognized by a blood-red color on the addition of a few drops of ferric chloride. Soluble barium salts will be recognized in the aqueous solution by a white precipitate on the addition of a few drops of dilute sulphuric acid. In the presence of lead, which would likewise be precipitated by the sulphuric acid, the two precipitates may be distinguished by the solubility of the lead sulphate in basic ammonium tartrate, whereas the lead will have been detected before, if the second-group test has been applied for metals, with hydrogen sulphide. Sulphates are detected in a diluted solution acidulated with hydrochloric acid, by a white precipitate, when tested with barium nitrate. Fixed impurities are indicated by a residue left after complete volatilization of the ammonium chloride, upon a platinum foil, or in a porcelain crucible. Metallic impurities may be detected in the aqueous solution previously acidulated with hydrochloric acid, by a coloration or precipitate when tested successively with hydrogen sulphide and ammonium sulphide. A precipitate thus obtained may be further identified according to methods given for analysis in groups by any good chemistry textbook on qualitative analysis. Iron may be recognized at once by a blue coloration, when the solution of the salt is acidulated with hydrochloric acid, and tested with potassium ferrocyanide.

Having determined qualitatively the presence of impurities, they may be determined quantitatively by methods given in good textbooks. The following tests are given as a means of estimation of the total impurities, and total true salt, which was the only quantitative estimation the question called for. Lack of space prevents a discussion of means of estimating each individual impurity. Some of these are hard to determine with the usual chemical equipment, and training of the average person.

Weigh a clean and dry test tube (call its weight a). Then add some ammonium chloride, say one or two

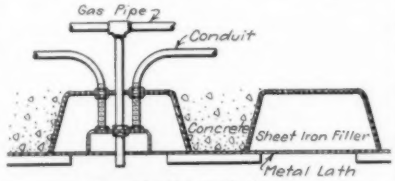
grams, taking care to deposit all of the previously powdered and dried salt in the bottom of the test tube. Weigh the tube again and call it *b*. Dissolve the powder by adding water to the test tube and then precipitate with a silver nitrate solution. Use only enough water to dissolve the salt, and use enough nitrate to completely throw down the precipitate, which is then washed with water and dried to a constant weight. Call this weight *c*. Wash the precipitate completely from the test tube onto the filter and wash with water. Be sure to get all the precipitate from the test tube, and all of it onto the filter paper. After having washed the precipitate a few times, dry it under the same conditions as before, to constant weight, then weigh and call this weight *d*. Then $b-a$ = the weight of the salt used and $d-c$ = the weight of the precipitate and $(d-c)/2.682$ should equal $b-a$, if the salt were pure and no errors were possible. The disparity between these values will give an idea of the purity of the salt, if care is taken in manipulating the apparatus, and avoiding all errors possible. Its purity, when free from other chlorides, may be conveniently and accurately determined volumetrically by dissolving 0.2 gram of the powdered and dried salt, in a beaker, in about 20 cubic centimeters of water, and after the addition of a few drops of a solution of potassium chromate, allowing a decinormal solution of silver nitrate to flow into the beaker from a burette, until with constant stirring the red coloration of silver chromate remains permanent. The number of cubic centimeters of silver nitrate solution which are required to produce this effect, when multiplied by the decimal 0.00535 will represent the amount of pure ammonium chloride in the quantity under estimation. By using exactly 0.2675 gram of the salt, and proceeding as above, the number of cubic centimeters of silver nitrate solution required to effect a complete precipitation, multiplied by two will indicate at once the per cent pure ammonium chloride.—H. E. W., Chicago, Ill.

No. 190.—Vehicle Batteries.—What number of cells is most commonly used at the present time for the storage batteries of electric vehicles? Is there likelihood of standardizing this so as to simplify the charging equipment and raise the efficiency of charging?—P. S. J., Rockford, Ill.

The number of cells used for storage batteries of electric vehicles varies with the type of battery, the motor, and, to a certain extent, with the size of the vehicle. In the lead equipment 42 and 44-cell batteries are the most common. At least five well known makers list the 42-cell equipment, while five other prominent concerns prefer 44 cells. One maker furnishes a 40-cell battery. Exceptions are noted in some of the smaller vehicles. A 24-cell outfit is supplied with a 750-pound wagon, while a 30-cell battery is found on 500 and 1,000-pound wagons. For Edison battery equipments 60-cell batteries are practically standard. In the 750-lb. wagon 40 and 48-cell Edison batteries are used by some makers. The number of battery cells is governed also by the motors which are available. The standard ratings of vehicle motors are 48, 60 and 85 volts. These are supplied in current outputs depending on the work required. The 48-volt motor is used with 24-cell lead and for 40 and 48-cell Edison batteries; the 60-volt motor with 30-cell lead and 60-cell Edison; and the 85-volt motor with the 40, 42 and 44-cell lead equipments. The low-voltage batteries are an expensive proposition when charged from the usual 115 to 120 volt direct-current lines. A large amount of energy is unnecessarily wasted in the charging rheostat. The only advantage of the low-voltage equipment is the lower first cost of battery and motor. The space occupied by the battery is decreased. This is an advantage when the battery is placed under either the seat or a front hood. The 44-cell lead and the 60-cell Edison equipment are, all things considered, the most satisfactory. When charged from the 115-volt line, there is a sufficient margin between the line voltage to permit any overcharge required.—R. E. P., Brooklyn, N. Y.

No. 191.—Code Problems.—1. Should rule 59*f* of the National Electrical Code be construed to require all outlet boxes to be independently supported? If so, I would like a few suggestions as to how it could best be done in the construction shown in the acompanying sketch, where sheet-iron fillers are used in place of tile and all outlets must be under these fillers, thus leaving no concrete to support the box.—2. Rule 28*f* states that gas pipes must be securely fastened in outlet boxes. How should this be done when the gas fitter merely drops a nipple through the box?—E. L. L., Bowling Green, O.

By reference to the accompanying diagram I believe the inquirer will understand a very simple way of fastening the box independently. By threading the



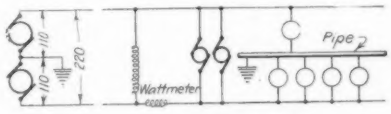
No. 191.—Code Problem.

conduit as shown and placing locknut above and below the sheet-iron filler the box can be independently and securely supported.—W. W., New York City.

To secure a gas pipe in the case mentioned in the second part of E. L. L.'s question will depend on the length of the nipple between the gas pipe and top of box. If this is a close nipple, a washer or several washers can be slipped onto the nipple between the end of gas pipe and box to just fill the clearance between them and thus prevent dropping of the pipe into the box. A nut or washer and nut on the nipple inside the box locks them together. If a long nipple is used, it should be threaded far enough to permit placing a locknut above and below the box.—H. B., Toledo, O.

No. 192.—Gas Pipe as Neutral Conductor.—Some time ago I came across an installation where the electrician, instead of putting in another wire to make a three-wire circuit out of a two-wire circuit, used the gas pipe for neutral conductor. The customer complained to me that ever since this was done his electric bill has increased considerably. I should like to know if using a gas pipe as neutral (which, of course, is not permitted) would of itself cause increase in current consumption and, if so, why?—W. F., New York City.

A 220-volt circuit can be assumed, since this is the most common for three-wire installations, giving 110 volts between the middle wire and either outside wire. With a straight two-wire circuit the arrangement stated would be impossible, for the rule is to ground the negative side, and thus there would be no potential difference between the negative wire and the gas pipe, and the customer would simply get 220 volts between the positive wire and the pipe. It must therefore be assumed that two generators are used, or



No. 192.—Gas-Pipe Neutral.

the generator is wound for a three-wire circuit, with neutral grounded. The pipe being grounded, would act as a neutral and the voltage between the pipe and either wire would be 110. A possible explanation of a higher meter reading is as follows. Suppose customer has been using motors and lamps on 220 volts and decides to change lamps over to 110. He will connect his lamp leads between the gas pipe and the outside wires, leaving his motors connected between the two outside wires. Now his wattmeter is connected for 220-volt service as shown in sketch. If he connects all his lights between the pipe and one outer wire, his meter will read the product of 220 volts times his lighting current, instead of 110 volts times the lighting current that he is actually using, thus doubling his lighting bill. If his lighting load is exactly balanced his meter will read correctly, but any unbalancing will cause his wattmeter to indicate a consumption in excess of that he is actually using.—V. A. C., Cleveland, O.

Wisconsin Electrical Association.

Sixth Annual Convention, Milwaukee, Wis., January 15 and 16.

There were approximately 250 members and guests registered when the sixth annual convention of the Wisconsin Electrical Association was called to order at the Hotel Pfister, Milwaukee, Wis., on January 15. A large amount of business was transacted at the four technical sessions which were held morning and afternoon of January 15 and 16, and the closest attention was given to the reading and discussion of the numerous subjects presented. A considerable portion of the program was devoted to the reports of standing committees, with but few papers. It has been the experience of the Wisconsin Association that more information of value to the greatest proportion of the membership can be obtained through committees working the entire year than by asking individuals to prepare papers in a limited amount of time.

While from every standpoint, the sixth annual convention was a notable success, there are two features of the technical program which will characterize the meeting as the most successful yet held by the organization. The paper by Halford Erickson, member of the Wisconsin Railroad Commission, entitled "Some Problems of Public Utility Accounting and Rate Making" is one of the most comprehensive and valuable contributions yet made to the voluminous data already available on this subject. The paper by S. E. Doane, chief engineer of the National Electric Lamp Association, on "High-Efficiency Incandescent Lamps and Their Central-Station Applications," was also particularly interesting, as it touched upon one of the vital present-day problems in central-station operation. The prelude to this paper which comprised a résumé of Mr. Doane's observations of central-station conditions in Europe, was both interesting and important in that it showed the extreme measures which the foreign utilities are adopting to secure small customers and the excellent results which they are obtaining in this respect. Statistics on the number of customers connected in most progressive American cities seem insignificant when compared with statistics from foreign cities of like size.

The first session of the convention was called to order by President William H. Winslow promptly at 9:30 a. m., on Thursday morning. The reading of the annual presidential address was the first item of business. Mr. Winslow commented on the fact that there are a large number of companies in the state that are making little or no real progress. While it is true that it is difficult to largely increase sales in small communities of very slow growth, it is also true, he said, that wonders have been accomplished under such conditions. The same situation applies in regard to the street and interurban railway companies of the state.

Mr. Winslow reviewed the activities of the Association during 1913, a major portion of which were in connection with legislative matters. An exceptionally large number of bills were introduced during the past year, many of which were of vital interest to public utilities, and it was therefore incumbent upon the Association to keep in close touch with these matters.

Mr. Winslow stated that at the last meeting of the Wisconsin Gas Association its Executive Committee was authorized to co-operate with the Electrical Association on legislative and other matters of common interest, and he therefore recommended that a committee be appointed to confer with the former association and to also consider whether or not a consolidation of the two associations or the formation of a general utility association would be preferable and desirable. Mention was made of the existing public utility and stock and bond laws of Wisconsin and their effect upon the public-service corporations. The latter, Mr. Winslow thought, has had a tendency to retard development of new companies.

In conclusion, Mr. Winslow recommended that a committee be appointed whose duty it shall be to ascertain what has been done in the state in the way of supplying electricity to farmers, what methods have been used, what results obtained and what the outlook for a profitable development of such business is.

A committee consisting of three past-presidents of the Association, viz., George B. Wheeler, Irving P. Lord and Ernst Gonzenbach, was appointed to consider the president's address and report at a later session.

George Allison then presented the report of the secretary-treasurer, which showed the business and financial conditions of the organization to be in a very flourishing condition.

A slight change was made in the order of business and the paper by H. G. D. Nutting, of Milwaukee, entitled "Practical Accounting System For Small Central Stations" was presented. As explained in the preface of Mr. Nutting's paper, the object of the system which he presents is to furnish the small-plant operator, who fills every position from the manager to meter man, with short cuts in practical accounting, eliminating books. The forms, which were shown on a screen, were worked up by Mr. Nutting when he was in charge of a small plant, and have been subjected to practical tests. Many excellent ideas are embodied in this paper and more extended mention, together with reproduction of the forms advocated, will be published in a subsequent issue.

Questions relative to details of the system proposed were asked of Mr. Nutting at the conclusion of his paper, several of which related to the relationship between the system advocated and that proposed by the Railroad Commission. Mr. Nutting explained that while his forms were different than those of the Commission they were based fundamentally on the principles involved in the latter.

R. M. Howard thought that the forms were of such importance to the small companies that they could well be printed by the Association and supplied to those desiring them, at nominal cost.

H. A. Miles, of Durand, asked as to what disposition was made of the difference in amount between total earnings and total cash received. Mr. Nutting stated that this must be posted on the form showing uncollectable accounts.

C. A. Seifert of the Railroad Commission called attention to the exhibit of the Commission in one of the adjoining rooms, showing a complete set of forms which had been worked out along the lines of those presented by Mr. Nutting. Mr. Seifert explained that while the Commission does not insist upon the use of these particular forms, the information that will be required from companies necessitates the use of these or some similar ones.

Mr. Nutting closed the discussion by urging small-plant operators to give serious consideration to the subject of simplifying accounting systems, and he stated that the Commission's requirements and the utility's requirements are mutual in this respect.

A paper was then presented by John B. Sanborn, an attorney of Madison, Wis., entitled "Review of New Laws Affecting Public Utilities." Mr. Sanborn, during 1913, was engaged by the Association to represent it in all legislative matters, and his paper commented briefly on some of the laws of particular interest to members of the Association.

New Laws Affecting Public Utilities.

Mr. Sanborn referred to the legislation enacted in the State of Wisconsin, pointing out that although the activities of the legislature during 1913 were without precedent public-service corporations of the state did not receive

any considerable attention. He explained, however, that many of the general laws enacted were of interest to utilities as corporations.

The most important of the laws now governing the relations between employer and employee is the Workingman's Compensation Act, and some rather important changes were made in this during 1913. The defense of "contributory negligence" was wiped out to the employer of four or more in common employment. This was done, not because of any inherent objection to the validity of such a defense, but in the desire to encourage the acceptance of the Act by employers of the state.

Another provision tending to bring as many employers as possible under the law, is that which places on them the burden of signifying their election not to be subject to the law. The intention to give every injured employee subject to the Act compensation for his injury is seen in the change from "wilful misconduct" which would defeat the recovery under the Act of 1911, to the "intentionally self-inflicted injury," which is necessary to defeat it under the Act of 1913.

Every employer subject to the Act is required to either take out indemnity insurance or convince the Industrial Commission that he does not need to do so.

Mr. Sanborn explained that the Income Tax has probably affected public-service corporations as little as any one in the state, because of the large personal property taxes which they pay.

On the financial side, the stock and bond law was amended to allow an increase of stock up to the actual value of the property of the corporation. Injunctions against orders of the Railroad Commission are regulated by two Acts amendatory to the Railroad Commission law and the Public Utility law. Under the former, no such injunction can be obtained unless the parties to the proceedings before the Commission are also parties to the proceeding before the court. In the latter, any party in interest may interplead in the action and if an injunction is sought in any action other than the one to set aside the order of the Commission, all parties to the action before the Commission must be brought in.

Municipal ownership of street railways is encouraged by allowing their acquisition, at any time instead of confining this to the three years prior to the expiration of the franchise. The Commission is given power to require the joint use of tracks by street or interurban railways, but in order to do this, it must find that public convenience and necessity requires this use of tracks.

A new water-power bill was enacted which requires that all future developments of more than 250-horsepower be public utilities; or as the Act states it, "for developing hydraulic or hydroelectric power for sale to the public." Such development must be by a municipality; an existing public utility; or a corporation specially organized for the purpose. Such corporation desiring to develop a water power owned by it, must apply to the Railroad Commission, which must approve the location of the dam, both with reference to its effect on navigation and development of power. The applicant must agree to certain conditions, the most important of which are to fully develop the water power and to install auxiliary power on the demand of the Commission; not to contract for the sale of the power for more than 30 years from the date of the franchise, after which date, the Commission may regulate the distance from the dam at which power is to be sold; to subject contracts for the Commission; to allow the collection of the franchise fee after 30 years, based on developed horsepower; to allow the acquisition of the property at any time within 30 years on payment of just compensation to be determined by the Commission, and without any allowance for the franchise and at any time after 30 years by the payment of the value of the physical structure at the date of the taking and the value of the power site at the date of the franchise, excluding, however, any value of the power site, by reason of its availability in connection with water power, except as far as such value had actually been paid for, for the property prior to the passage of the Act.

Mr. Sanborn held that in view of all the uncertainties arising out of the constitutional and practical questions involved in this Act, the immediate development of new water power in Wisconsin does not seem to be bright.

In conclusion he thought that the public-service corporations of Wisconsin had been very thoroughly regulated during the past 10 years. Whatever may be the exact proportion between the well and ill-advised parts of this regulation, there is no doubt that a rest from further changes for a few years at least, is highly desirable.

President Winslow, at this point, called attention to the importance of central-station companies making a thorough study of line extensions, considering their cost, the revenue attainable therefrom; maintenance, etc. He thought it desirable for a utility to have a specific policy that would apply in the matter of extensions, the fundamentals of which could be the same for all companies.

H. G. D. Nutting stated that at present the policies of companies in the matter of making extensions varied greatly. Some companies will make extensions only when the annual gross revenue from such extensions equals the first cost, sometimes the revenue is distributed over two or three years; and still other companies have no set rule in this connection. He emphasized the importance of making a careful analysis of the cost of taking on new customers in every case, and referred briefly to a formula which he has worked out involving the various costs that enter into extensions. These include interest on the investment, depreciation, taxes, operating expense, maintenance, overhead charges, etc.

A motion was made and carried to the effect that the incoming president be authorized to establish a standing committee to thoroughly investigate this subject.

Thursday Afternoon.

F. J. Natwick, a contractor of Grand Rapids, Wis., opened the meeting on Thursday afternoon with a brief address, in which, as a representative of the Wisconsin Electrical Contractors' Association, he asked for the co-operation and support of the central-stations. He thought that much good could be accomplished if the various electrical interests would work in harmony and if the various associations would co-operate with each other. He expressed the hope that at the next annual convention a paper would be presented outlining some feasible plan of co-operation with the contractors. The Electrical Contractors will meet again in Milwaukee in April, and Mr. Natwick extended a cordial invitation for central-station men to attend.

The final report of the Committee on Train Dispatching was then presented by E. W. Hammett, of Sheboygan, chairman. This report is an elaboration of the paper presented by Mr. Hammett at the convention last year, with specific recommendations for a street railway operation in Wisconsin. The recommendations include (1) that a telephone system be used between the train dispatcher and the various sidings; (2) the employment of a time table that gives comprehensive data on train movements; (3) written train orders; (4) a train sheet which should be an official record of the movement of all trains; (5) all sidings should be either numbered or named; (6) the dispatcher should be a man of responsibility and of character capable of properly performing the duties involved.

A somewhat extended discussion was entered into between Messrs. Pulliam, Hammett, Gonzenbach, Stearns and Treat. Mr. Pulliam held that many interurban lines are merely extensions of city lines and therefore steam-railroad dispatching rules do not apply. Mr. Hammett thought that on small roads the dispatcher could devote part of his time to other

duties and thus justify his employment. Mr. Gonzenbach stated that the question of time-table rights was the most important consideration in interurban operation.

Following this discussion a paper entitled "Street Railway Traffic Surveys in Relation to Railway Operation, Management and Regulation" was presented by C. M. Larson, chief engineer of the Wisconsin Railroad Commission.

This paper points out that railway traffic analysis in its present form is a comparatively new science and large savings can be effected in construction and operating costs by the adoption of proper routings and schedules. A traffic-study department should be established on all large systems and where the expense of such a department is too large the manager, or traffic executive, of the system should make these studies individually. Mr. Larson proposed a field book in which such data can be tabulated and easily referred to.

Such traffic surveys as those outlined are essential if the company is to furnish the public with the best possible service. With traffic data at hand, every manager would be in a position to do his own regulating without appeal to the commission. Charts, showing the methods of making traffic surveys, were exhibited.

In the discussion Mr. Stearns of the Milwaukee Electric Railway & Light Company stated that surveys made by the Commission, in a manner similar to those outlined in the paper, had materially aided the traffic situation in Milwaukee. One result was that part of the cars on several lines were routed only to the limits of the heaviest traffic zones and were allowed to be turned back from this point. Mr. Stearns added that the Milwaukee company inaugurated, on January 18, a revised system of fares. The suburban traffic surrounding Milwaukee has been divided into mile zones and a fare of two cents a mile has been established outside of the regular five-cent city zone. Mr. Stearns explained that prepayment cars are used exclusively and passengers pay the additional fare on leaving the car. Messrs. Rosencrans, Ewing and Larson also entered into the discussion.

The report of the Committee on Electric Service Rules Revision was then presented by F. A. Vaughn of Milwaukee, chairman.

Electric Service Rules Revision.

This committee was appointed primarily as the representative of the Wisconsin Electrical Association to act officially with the Railroad Commission in revising electric service rules. The Committee reported its activities in this capacity, which are clearly illustrated in the acceptable rules established by the Commission. The report recommends that the Association have a standing Committee on Meters which would co-operate with other state committees with like functions and with national committees as well, so that a uniform standardized system of service regulation will be developed. Some of the hardships that have been imposed on utilities because they did not co-operate with commissions in explaining their positions were cited.

J. N. Cadby of the Railroad Commission opened the discussion endorsing the suggestion made by the Committee of having a permanent committee of the Association to study and report on this subject.

The work of the Standards Laboratory of the University of Wisconsin, which, in connection with the electrical engineering division of the Railroad Commission, has been making various tests and examinations in the interest of utilities, was outlined briefly by a member of the Laboratory staff. Results of tests made on meters submitted to this laboratory were announced as follows. Of a definite number of meters tested 50 per cent were of the portable, standard, watt-hour meter type. Of the alternating-current meters of this type 77 per cent were found to be outside of the one-half per cent limit of accuracy, and two and one-half per cent were found to be outside of the four per cent limit; of the direct-current meters of this type 87 per cent were found to be outside of the one-half per cent limit of accuracy, and 25 per cent outside of the four per cent limit. Some meters tested were as much as 15 per cent inaccurate. The laboratory has under consideration a standard type of shipping box suitable for shipping meters to be tested.

P. H. Korst.
President-elect, Wisconsin Electrical Association.

F. A. Vaughn called attention to the work of the Meter Committee of the National Electric Light Association, mentioning particularly the investigation at present being carried on to determine the status of maximum-demand instruments. Letters are being sent to all member companies, asking as to the types of maximum-demand instruments used and what time interval is approved for the various classes of service.

George B. Wheeler, of Eau Claire, as chairman of the Committee on Co-operative Advertising and Publicity, then presented his report. It is held that co-operative advertising under the auspices of the Wisconsin Electrical Association is unnecessary in view of the number of advertising companies well equipped to give such service, and also in view of the excellent advertising literature furnished by the large manufacturers. The Committee urges every utility company to use daily newspapers with greater regularity and greater liberality. It is incumbent upon public-service companies also to furnish the public through the newspapers, full details of its policies and intentions. Utilities have nothing to conceal in their business relations with their customers.

It is recommended that the Association take steps to advise the public that the regulation of public-service companies is more to be desired than public ownership, and the Advisory Committee of the Association is instructed to carry on a campaign in this connection.

President Winslow then appointed a nominating committee comprising O. C. Irwin, D. C. West and L. H. Lathrop.

Friday Morning Session.

The first item of business taken up on Friday morning was the report of the Committee on Overhead Inspection, of which S. B. Way was chairman.

Overhead Inspection.

The Committee observes that very little appears to have been accomplished in the past by the operators of overhead distributing systems in preparing or promulgating rules relative to systematic inspection of overhead systems, although the desirability of such systematic inspection is probably well recognized by all operators of such systems. The objects to be gained by systematic inspection are: (a) reduction in hazard to employees and the public generally; (b) the improvement of service rendered to customers.

The degree of hazards to life, limb and property and the character of the service delivered to customers are dependent, to a certain extent, upon the quality of material, the character of the workmanship and the plans employed in the original construction. To secure safe distributing lines, the prime requisite is, of course, good material, but good material is of little avail if the workmanship is poor, or the scheme of construction has not taken into account the conditions under which the line must be constructed and operated.

Ideal inspection can only be made with the aid of thoroughly competent inspectors, and the scarcity of such men constitutes the principal difficulty

in securing the hoped for results. Utilities having organizations of such size as to make possible the maintenance of a separate department devoted to the inspection of the system and the correction and elimination of troubles as they are disclosed, can secure satisfactory inspection service without great difficulty, because the men who do the work are especially trained to look for trouble or conditions likely to cause trouble. In smaller utilities, this work must be done more or less incidentally with other work, but nevertheless should receive attention.

To safeguard workmen and to reduce the hazard incident to the vocation of linemen, requires that the lines be inspected with reference to space provided on the poles and between the wires carried on the poles or cross-arms, so that men required to work upon the poles will at least have an opportunity to keep clear of grounded or live wires while working on other wires. It is likewise necessary to inspect, at the same time, for more or less hidden defects or hazards, such as grounded braces, rusted guy wires and decayed or burned poles, cross-arms and pins. Appliances which men are required to reach with relative frequency, such as cutouts, fuse blocks, disconnecting switches, lightning arresters, etc., should be so located and arranged as to be reached by a man standing on pole steps or on his supports without coming in contact with other equipment, especially ground wires cleated to the pole, or grounded guys.

Inspection, with a view of safeguarding the public generally, requires noticing and reporting all cases of unduly slack wires, decayed or burned poles, cross-arms and pins or contact with or small clearance from trees, building, other structures and other wires of all kinds. The likelihood of accidents to both employees and the public resulting from broken poles or wires may also be reduced if attention is given to the matter of properly guying poles, lines and equipping guy wires with strain insulators suitable for the voltage of the lines carried on the poles. Annoying and sometimes costly accidents to the public resulting from stumbling against guy rods entering the ground, may be minimized by placing around such rods wooden guards or boxes painted white, which will render them readily visible even at night.

The frequency with which inspection should be made will vary over extremely wide limits, depending upon the character of construction, proximity of trees, other lines and structures, voltage, and the relative importance of the different lines constituting the same general system. An important high-voltage transmission line delivering large quantities of power and upon which, perhaps, several communities depend, would require more frequent inspection than a less important line, in order to properly safeguard the service.

The committee believes the following schedule should be used in determining the minimum frequency of inspection of the several classes of the lines enumerated:

Voltage of Lines.	Frequency of Inspection.
7500 volts or over..	3 Months
1000 to 7500 volts..	6 Months
Less than 1000 volts	1 Year

To insure the inspection of the several classes of lines at the required frequency, a card index follow-up file will be found convenient. The report forms provided should be arranged to minimize the clerical work required of the inspector, by showing a diagram of a pole with cross-arms and pins and by giving a printed list of defects to be looked for, so that the inspector may check off readily the items which are not found, and indicate otherwise, as, for instance, by a cross mark, the locations of defects. The back of the report form should be used for further description in detail of conditions which cannot be indicated on the diagram, as, for instance, corroded guys and bad clearances.

This report was discussed by W. E. Haseltine, F. A. Vaughn, W. H. Winslow, P. H. Korst and S. B. Way. Mr. Haseltine suggested that the reports be printed and specially distributed, so that members could follow the excellent suggestions made.

Mr. Vaughn stated that overhead inspection needs to be standardized along the lines outlined by the committee. While details must be worked out by each company to cover local conditions, the fundamentals involved can be universally

Group at Rejuvenation of Sons of Jove Held During Convention of Wisconsin Electrical Association.

applied to all utilities. He added that standardization of inspection methods means protection in case of litigation.

Mr. Winslow supplemented Mr. Vaughn's remarks, stating that in addition to making periodical inspections utilities must be in a position to prove that such inspections have been made in case of damage suits, or other legal troubles.

Mr. Korst thought that the suggestions offered by the committee should be submitted to the Industrial Commission of the state, in line with its work in accident prevention. Mr. Winslow explained that the rules of the Industrial Commission do not cover inspection, but he thought that the Commission would welcome the co-operation of the Association. Mr. Vaughn added that the Association should put itself in a position to make suitable recommendations to the Commission and not wait for it to act first.

The paper by G. G. Post, electrical engineer of the Milwaukee Electric Railway & Light Company, entitled "Voltage Regulation. Its Necessity and How Accomplished" was then presented by the author. Mr. Post divided the subject into two general headings: (1) The Necessity of Regulation and (2) How to Accomplish Regulation. Under the first heading it was pointed out that good service is dependent upon good regulation and, as the function of the central station is mainly to provide service, the importance of good regulation can be appreciated. For lighting circuits the voltage should be maintained within three per cent of the normal voltage and within ten per cent on power circuits. Some of the objectionable features of poor regulation were mentioned such as shortening the life of lamps, reducing candlepower, etc. If central stations provide free lamp renewals, the shortening of the life of the lamps is expensive and if candlepower is reduced, dissatisfaction of customers results.

In general, regulation is accomplished in two ways; either by regulation at the station busbars or regulation of the individual feeders. The first gives satisfaction where only one feeder supplies the system and is accomplished either by hand or by means of an automatic regulator. Regulation of voltage on individual feeders is necessary in systems comprising two or more feeders.

In direct-current systems of 150-kilowatt capacity or less automatic regulators of the Tirill type can be used to advantage. In systems larger than 150-kilowatts, Tirill regulators can be used but additional means must be provided. The greatest reliability of service is obtained by tying together the various feeders at the busbars. The practice of the Milwaukee Electric Railway & Light Company in this connection was cited.

In alternating-current systems the regulation is the same as in direct current for the small plants. In larger alternating-current systems records should be obtained from outlying sections, and the main voltage of the busbars should be maintained at such a value as to give the best results at the customer's installations. In making voltage surveys, Mr. Post pointed out that, as it is impossible to place suitable instruments in a customer's premises, voltmeters should be placed in boxes and mounted on poles in various parts of the system.

Numerous lantern slides were shown illustrating various types of regulating apparatus and voltage charts of the Milwaukee company, showing unusual disturbances with explanation as to their cause.

In the discussion it was pointed out by one small utility operator that the rules of the Railroad Commission are unnecessarily severe in the matter of regulation. It was stated that Mr. Post's paper showed the elaborateness of detail that must be carried out to comply with the rules. Such equipment and work is almost prohibitive for the small central stations.

W. E. Hazeltine reported that he has encountered no difficulty in meeting the Commission's requirements as to regulation, and this in view of the fact that lighting and power service is taken from the same lines. He added that Tirill regulators were used.

V. A. Hain, of Chicago, stated that it is essential to make careful voltage surveys in order to determine upon the remedies that must be applied. The regulation of lighting feeders should first be considered, as the effect of poor regulation on these customers is decidedly more noticeable than in the case of power customers. Good regulation, however, is also essential on power lines, in order that motors may operate at their highest efficiency. Mr. Hain pointed out that meters run slow if voltage is below normal and this affects the revenue of the central station.

A very interesting paper entitled "High Efficiency Incandescent Lamps and Their Central-Station Application" was then presented by S. E. Doane, chief engineer of the National Electric Lamp Association.

High-Efficiency Lamps.

Mr. Doane's paper was divided in two parts, the first dealing with the results of an extened investigation made of central-station conditions in Europe, with special reference to the activity of these companies in going after the business of the small customer; and the second part dealt with the construction and applications of the new high-efficiency tungsten-filament lamps. Regarding European conditions, Mr. Doane said that central-station practice has been more extreme there than in this country. There is less interchange of ideas and practice and less discussion between central-stations than here.

Interesting statistics were presented covering an European city of about 650,000 inhabitants where a privately owned plant was in completion with a municipal plant. The former had about 40,000 meter customers and about 25,000 customers on limiting devices. The city plant had about 24,000 customers on limiting devices, making a total for the city of over 90,000 customers. The average connected load of the 25,000 customers of the private company is 21.7 watts. The rates cover everything from a single 10-watt lamp upwards. This single 10-watt lamp is supplied for 16 cents per month, including wiring rental.

Dividing his observations under the headings of soliciting; installing; billing and collecting; metering and its equivalent; and relations with contractors, Mr. Doane said that as regards soliciting the activity of most European companies is centered on the small customer on the theory that the housewife, whom they figure they must address, will insist on electric light being installed in her home if her poorer neighbor has it, whereas the reverse is not true. The customer's installation is often financed in some manner by the central station. Collections are made periodically in small installments, with a sufficient additional amount to pay interest on the money thus invested.

The billing and collecting schemes are most ingenious, consisting of making out a card with a number of coupons attached once a year and handing this card with the coupons attached to the collector, and billing the collector at each period for the total amount charged to his account. Twelve of the coupons are attached if collection is to be made once a month, four if to be made once a quarter, etc. At the period named the collector exchanges a coupon for the cash. The collectors, in many cases, are employees of beer gardens, etc., and work without commission.

All of these small customers are charged on a flat-rate basis and invariably a circuit-breaker or limiting device of neat compact appearance and low first cost is used. In most cases the cost of this device does not exceed $1.50. Lamps of the very highest efficiency are installed with suitable reflectors, the average small customer using 1.8 lamps each. Customers buy their own lamps.

In practically every city investigated the contractors and central-stations were working in harmony. The contractor secures, in some cases, finan-

cial assistance in the purchase of his supplies. The central station points out that in as much as they expect to finance their customer in any event that they only have to carry this financial load a few days more if they finance the contractor also, and consequently it means little to them whether they pay their money out for the material or for the completed job. By purchasing in quantity and billing these supplies to the contractor on open account, and then crediting him with the installation, they can use their size and financial standing to assist the contractor which merely means financing the business as a whole.

Speaking of the new high-efficiency lamps, Mr. Doane briefly described the theory upon which they are manufactured, and the chemical action resulting from the use of nitrogen gas in the bulb. The feature of this latest development is tungsten wire coiled into a small area to reduce convection loss when operated under gas pressure to reduce evaporation. Commercially it will, of course, modify central-station practice to some extent. Mr. Doane stated that unless arc lamp manufacturers produce something new, the end of the arc lamp is indicated as clearly as is that of all the other older types of electrical illuminants.

Chicago Degree Team Which Conducted Rejuvenation in Milwaukee.

While, when used at the highest amperage, an efficiency as low as one-half watt per candle is obtained, as lower amperages are employed there comes a place where the vacuum lamp is more efficient, the reason being that the less mass of wire allows a greater percentage of loss due to heat convection. The new development, although revolutionary in scientific effect, will simply extend the commercial fields to which incandescent lamps have been applied in the past. Mr. Doane, in conclusion, urged that the lamps be referred to by their efficiency and size without regard to the particular construction which makes these efficiencies possible at the sizes given.

In the discussion F. A. Vaughn inquired whether contracts for service with the small customers in Eurone, covering long periods, were made with the householder or the tenant. Mr. Doane explained that there is no set rule for this but usually, if the contracts cover a long term, they are made with the owners. The amounts involved are so small that the new tenants do not hesitate to assume the monthly payments when moving into wired apartments or houses.

C. M. Axford asked if the central station or contractor carries the wiring accounts. He also called attention to the efficiency of the long-burning flame-arc lamp which approximates that of the new tungsten-filament lamp. He spoke also of the effect of voltage on lamps and thought the central station should have the control of the lamps to be used by customers to insure proper service.

S. B. Way thought the American central station must follow along the same lines as indicated by Mr. Doane in securing the business of the small customer. The flat rate with limiting device partially answers this question, but not where heating devices are used.

Mr. Doane explained that invariably central-station companies have been able to place customers wishing to use heating devices on a meter basis. He added that the limiting device is one of the best opening wedges for meter customers so far known. Answering Mr. Axford as to flame-arc-lamp efficiencies, Mr. Doane said that should the high-efficiency tungsten lamp be equipped with a reflector, so as to give the same distribution as the flame-arc lamp, the efficiency of the former would be correspondingly greater.

Friday Afternoon Session.

The paper by Halford Erickson, member of the Wisconsin Railroad Commission, entitled "Some Problems of Public Utility Accounting and Rate Making" was presented at the opening of the afternoon session. Owing to the absence of Mr. Erickson, J. E. Doolittle of the Commission presented this paper which will be published in full next week.

Reports were then presented by the Membership Committee and Auditing Committee, the former reporting several new members and the latter indicating the books of the Association to be in a satisfactory condition.

A. A. Gray, of Chicago, then spoke briefly regarding the Society for Electrical Development, outlining the functions of this society and the good that can be accomplished if the co-operation of all interested in the development of the electrical industry can be obtained. It is confidently expected, Mr. Gray said, that the active work of the society will begin in March of this year, as all indications point to the successful raising of the fund of $200,000 which was set as the initial amount required.

F. J. Natwick again spoke of the desire of the electrical contractors of the state to actively co-operate with central-station interests and he recommended that a committee be appointed to attend the next meeting of the Wisconsin Electrical Contractors Association.

The Nominating Committee then reported its selection for officers for the ensuing year and the secretary was instructed to cast the ballot of the Association for the following candidates:

President, P. H. Korst.
First vice-president, M. C. Ewing.
Second vice-president, W. E. Haseltine.
Third vice-president, B. F. Lyons.
Secretary-treasurer, Geo. Allison.

Mr. Korst then took the chair and

George B. Wheeler presented the report of the Committee on the President's Address. It was recommended by this Committee that the incoming president appoint a Committee on Associations; a Committee on Rural Extensions, and also that the advisory board of the Association be authorized to reimburse Secretary Allison to the amount of $300 for clerical work in connection with his office.

The two papers entitled "Comparitive Maintenance of Car Electrical Equipment" were then presented. E. Taylor of the General Electric Company presented one paper and Clarence Renshaw of the Westinghouse Electric & Manufacturing Company presented the second paper on this subject. Both papers dealt with economies in railway operation incident to the replacement of old type electrical equipment with modern apparatus.

Entertainment.

The entertainment provided was somewhat of a departure from the usual diversion which has been an annual feature of the Wisconsin meeting, in that a theater party on Thursday evening, with an informal supper following, took the place of the usual annual banquet. At the supper, at which Ernst Gonzenbach acted as toastmaster, addresses were made by Messrs. Searle, Axford, Hobson, Bowler, Allison, Gould and Wheeler.

On Friday evening a rejuvenation of the Sons of Jove was held at the Wisconsin Hotel at which 24 candidates were initiated. A supper and cabaret followed the initiatory ceremony. The entire Chicago Degree Team, under the management of Mr. Hawkins, was present to conduct the ceremony.

Exhibits.

During the convention a meeting of the Wisconsin Electrical Exhibitors Association was held, at which the following officers were elected: President, J. C. Schmidtbauer, Julius Andrae & Sons Company, Milwaukee. Vice-president, W. H. Tompkins, Western Electric Company, Milwaukee. Secretary-treasurer, H. F. Boggis, C. J. Litscher Electric Company, Milwaukee.

Exhibits were maintained by the following companies: Allis-Chalmers Manufacturing Company, Julius Andrae & Sons Company, Central Electric Company, Duncan Electric Manufacturing Company, Electric Appliance Company, General Electric Company, Harter Manufacturing Company, Illinois Electric Company, C. J. Litscher Company, Moloney Transformer Company, National X-Ray Reflector Company and the Western Electric Company.

National Independent Telephone Association.

Brief reference was made in our issue of last week to the seventeenth annual convention of the National Independent Telephone Association, which was held at the Hotel La Salle, Chicago, on January 13 to 15. The total registration at the convention was about 450. The large attendance at the meetings, the interest in the proceedings and the attention given to the telephone exhibits all indicated a very successful gathering.

The first session was opened on Tuesday afternoon by President Manford Savage. A nominating committee was elected, composed of C. E. Tarte, C. C. Deering, W. N. McAnge, Jr., B. Adams, and G. R. Johnston. A committee on resolutions, consisting of N. G. Hunter, H. D. Critchfield and M. S. Taylor, was also elected. The main feature of this session was the eloquent address by J. Adam Bede, ex-congressman from Minnesota, who in his talk referred to the development of the country, the many problems it had brought about, the positive manner in which these problems are being solved one by one, and the assurances that further progress will involve new problems which must be taken up in the same way. Mr. Bede enlivened his address with many characteristic sparkling and humorous references.

On Wednesday morning the session opened shortly after 11 o'clock with an address by Richard Yates, ex-governor of Illinois, and member of the new Illinois Public Utilities Commission. He referred briefly to the act of the last legislature through which the new commission of which he is a member was created, and spoke of some of the duties, powers and rights of the commission. He was pleased to note that the association had expressed favorable opinion as to commission regulation and that it promises to co-operate with the commission. The service of telephone companies, as well as that of nearly all utilities, can be improved. The differences that have arisen between the utilities and the public are largely of an economic nature and it is the province of state commissions to adjust these differences. He was pleased to see that the efforts of the new commission had been welcomed by the press, the utilities and the public in general. Light must be thrown on all public utilities and there must be publicity of accounts. In the handling of all utility problems there is a threefold interest, viz., the utility company, the consumers of the utility and the state. The introduction of the latter new factor into the regulation of the utility business is not to be feared, since it preserves all that is good and allows full co-operation. Mr. Yates stated that the desire of the commission was to maintain an unbiased attitude and to refrain from decision or public discussion of all cases that likely will come up before the commission before they are presented. The commission realizes it is a court as well as a board. Comparing the work before the new Illinois Commission with that under the jurisdiction of the Public Service Commission of the Second District of New York, Mr. Yates showed that the New York Commission has a total of 924 companies under its control, whereas the total utility companies under the control of the new Illinois Commission is 3,023; classified as follows: 255 steam-railroad corporations, 306 electric street railways, 8 express companies, 647 electric light companies, 152 gas companies, 1,462 telephone and telegraph companies, 84 waterworks companies, 18 water-transport companies, 8 water-power companies, 83 miscellaneous utility corporations.

William Fortune, president of the Indianapolis Telephone Company, then gave a talk on the income tax law. In this he called attention to the fact that most of the regulations respecting the new tax are based on British practice The regulations drawn up by the government authorities for carrying out the law have imposed a mass of bewildering requirements, many of which are impracticable and unreasonable; new interpretations and regulations are being issued from time to time, so that a feeling of indefiniteness as to exactly what is required has arisen. The most unsatisfactory feature of the new regulation is that requiring collection of the tax at the source. Mr. Fortune called attention to the serious defects of this policy and the difficulties that will be encountered thereby. An enormous amount of "red tape" is thrown onto American financial institutions. Conditions in this country are not what they are in England and it is against the principles of the American people to assume that everyone is dishonest. Therefore, Mr. Fortune urged that the association take part in the strong movement now being made to bring about a change in this impractical requirement of the income tax law.

The report of the Nominating Committee was then submitted. It contained the names of 21 nominees for directors, and 14 others were to be nominated from the floor; four nominees were designated in the latter manner and the ballot ordered printed.

The afternoon session was devoted chiefly to the annual presidential address.

President's Address.

In opening his address, President Savage said that conservation is the live topic of the day and therefore it

seemed proper that the Association take up active measures looking toward the conservation of the interests of the stockholders of operating telephone companies. In the early days of the independent telephone industry permanency of the investment was not given proper consideration. This, however, is now insisted upon by state regulatory commissions. He referred to the work of James J. Hill in railroad building, in which incidentally a great deal of attention was devoted to the development of the country tributary to the railroads, but at all times the interests of the railroad stockholders were conserved.

Many mistakes were formerly made in the telephone industry. Many independent telephone men have insisted that any one departing from the policy adopted 15 years ago is guilty of disloyalty. The public, however, has discarded loyalty to independent telephone companies for law, and has openly declared that its only interest in the telephone business is to get the best possible service at the lowest rate. The law has been changed to fit economic conditions. There are now very many telephone men, however, who insist that the telephone business shall adapt itself to changing conditions and enable itself to make the same progress that is being made in all other lines of the business world. Mr. Savage compared the conditions of the transcontinental railroad and of the farmer with the telephone industry, showing that the same rules of following up-to-date methods produce a profitable business.

In the earlier days of independent telephony it was necessary, on account of the imminent danger of destruction, to maintain eternal vigilance as the price of existence. But now, since the numerous antidiscrimination statutes, the public utility commissions in many states and the increasing powers of the Interstate Commerce Commission prohibit discrimination, authorize the physical connection of lines and in general prohibit unfair practice, it seems that the time has come when telephone men may devote their energies to urging a high standard of efficiency and to placing the industry on a firm and permanent foundation, so that there shall be little difficulty in obtaining additional capital for further development.

Mr. Savage reiterated his belief in the local control of local telephone business. He spoke of the great recent advances made in the development of the telephone industry, particularly the recent agreement between the American Telephone & Telegraph Company and the Federal Government authorities. In connection with this, there are many details to be worked out before a satisfactory plan of connection between independent and Bell toll lines can be worked out. The agreement states publicly that the Bell interests do not want to do all of the telephone business of the country; this in itself is a tremendous stride in advance. This concession should be accepted in the spirit in which it is presumed to be made and independent telephone men should therefore seize the opportunity to serve the interest of their stockholders and assist in placing the entire telephone industry on a permanent paying business. The enmities of the past must be thrown aside and all must go forth with kindly feelings to meet the new conditions. The time now is ripe for constructive and not destructive methods.

Referring to a recent address by Chairman Clark of the Interstate Commerce Commission, President Savage thought it was time to let the dead past bury its dead, and to face the future in the living present. Since this attitude was so clearly stated by Mr. Clark, he thought it should be supported since other regulatory bodies are taking the same view. In doing this no basic principles need be abanoned. The interchange of service has been insisted on by independent telephone men for a long time. It is necessary merely to modify the principles and to discard lines of action followed in former years. The old days of unrestricted, cut-throat competition in the telephone business must cease. In order to get the most benefit from the recently announced agreement, the independent telephone interests must agree on exactly what they want in the way of long-distance facilities. Since the self-interest of the Bell companies depends upon carrying out the apparent spirit of the agreement, fear of its real intent is unwarranted. If legislation is needed or if positive rules by the Interstate Commerce Commission are required to secure the benefits of the agreement, it will not be difficult to obtain these when all parties agree.

The former antagonism of the two telephone camps has produced a timidity in the minds of the investing public that has placed their stocks and bonds nearly at the bottom of the investment list. It has also encouraged the enactment in many cases of laws so drastic, and educated the people to telephone rates so low, as to make it dubious whether a telephone company in the future can give up-to-date service and make a reasonable profit. The public is now well able through various specific laws, state and interstate commissions, to take good care of itself against monopoly and oppressive tactics on the part of any utility. It should be left to commissions and to the public to decide whether one or two systems shall furnish the telephone service in any community.

Mr. Savage compared the giving of telephone service to the construction of a telephone cable, in which the insulation of the wires corresponds to the self-interest of the individual companies and the outer sheath to the National Association. The latter has attempted to keep pace with the changes of the times. The opinion is being more and more generally held that unlimited competition is a curse. "Monopoly" and "competition" are two of the most abused words of our language. It is high time, therefore, that we substitute in place of them the word "co-operation." Since most of the obstacles in the way of co-operation have now been removed, it is only right to expect that telephone companies will co-operate with each other and with the various regulatory commissions in developing the telephone service and the business to its utmost. As the first instance of an opportunity for co-operation, Mr. Savage called attention to the need of careful consideration of the details for long-distance service. What is now needed is self-control and a sensible view of the situation.

In closing, Mr. Savage referred to President Wilson's openly expressed gratification that the business interests of the country are adjusting themselves to changes brought about by recent legislation and the spirit of the times, and therefore there is no dishonor in any independent telephone man co-operating with those with whom he must do business and thus quickly accomplishing what the government desires.

On motion of Judge Hunter, who eulogized the address of President Savage, the address was unanimously approved by the convention. The remainder of the session was devoted to a general discussion of points to be cleared up in the conference proposed to be held during the following session between an official of the American Telephone & Telegraph Company and the convention. Several speakers asserted they had already made toll contracts with subsidiary Bell companies on better terms than were offered in the December 19 agreement. Efforts should therefore be made to crystallize the desires of the independent interests so that these may be taken care of in determining the working details of the agreement. Taking part in this general discussion were W. H. Bryant, N. G. Hunter, H. P. Folsom, W. J. Thomas, G. W. Schweer, C. E. Tarte, C. J. Garlow, T. W. Allen, J. D. Powers and J. B. Earle. A motion was adopted calling for the appointment of a committee to consider the matter further; N. G. Hunter, W. H. Bryant and H. P. Folsom were appointed to constitute the committee.

Election of Directors and Officers.

On Thursday morning the last session of the convention opened with the announcement of the balloting for directors of the association for the ensuing year. The election resulted as follows: Manford Savage, Champaign, Ill.; N. G. Hunter, Wabash, Ind.; J. B. Earle, Waco, Texas; W. J. Thomas, Shelbyville, Ky.; C. Y. McVey, Cleveland, O.; L. D. Kellogg, Chicago, Ill.; Warren Pratt, Kearney, Neb.; F. B. MacKinnon, Topeka, Kans.; H. C. Todd, Maryville, Mo.; H. B. McMeal, Chicago, Ill.; C. E. Tarte, Grand Rapids, Mich.; W. C. Handlan, Wheeling, W. Va.; P. J. Weirich, Monroe, Wis.; J. M. Plaister, Fort Dodge, Iowa; Terry W. Allen, Jackson, Tenn.; Roy B. McCanne, Rochester, N. Y.

Directly after the session closed the new board of directors met and organized by electing the following officers:

President, N. G. Hunter.

Vice-president, C. Y. McVey.

Secretary-treasurer, F. B. MacKinnon.

Resolutions.

The Committee on Resolutions submitted a series of resolutions that were adopted. Of these, the first affirmed the belief of the association in locally owned independent telephone systems and that the people in any locality be

permitted to determine the kind of telephone service they desire; the enactment of laws was favored that would secure to any and every local telephone system adequate long-distance service, but, if such laws could not be secured, then additional Federal regulatory control to insure this was favored; the control of local or intrastate business should be left to the states; laws should be passed to prohibit any operating telephone company from manufacturing or selling telephone apparatus or supplies; what constitutes lawful business and unlawful business should be legally defined. The income tax law should be amended to provide for information at the source but not collection or deduction at the source. Other resolutions thanked the exhibitors, press, hotel and others who had contributed to the success of the convention. The seventh resolution called on the board of directors of the association to receive suggestions from members respecting desirable details to be included in the agreement for the use of Bell toll lines, that these be formulated into a definite plan and submitted to the American Telephone & Telegraph Company in conference and then, if agreed upon, to the attorney-general of the United States for approval; if it shall be found that the Interstate Commerce Commission has not sufficient power to carry out such agreement, congressional enactment to give it this power should be sought.

Considerable discussion took place of one clause in one of the resolutions, which in its submitted form favored government operation of long-distance lines as an alternate, if legislation insuring the use of such lines to all telephone companies was not secured. Much opposition was expressed to any seeming approval of government ownership or operation and this was finally amended to read "additional regulatory control by the Federal Government." Among those taking part in this discussion were H. P. Folsom, N. G. Hunter, F. H. Woods, G. H. Glass, J. B. Earle, G. W. Schweer, H. D. Critchfield, T. W. Allen and P. J. Weirich.

It had been expected that N. C. Kingsbury, vice-president of the American Telephone & Telegraph Company, would be present at the last session of the convention, which was planned to be a conference on toll connections between independent companies and the Bell interests. Mr. Kingsbury had promised to be present and explain the recent agreement covering this matter but was prevented by serious illness from so doing. In a telegram, however, he expressed his regret at being unable to be present. He added, "We are working out the details of the plan. There are many complications, but we shall do what we can to make the operation of the plan a complete success. Our attitude is to do much, and do it as well, in the way of co-operation along the lines proposed, as we consistently can and not as little."

President Savage expressed regret that ex-Governor Hadley of Missouri, who was to speak before the convention, was called away and was unable to return before the close of the meeting. He then made a brief address thanking the members for their support during his administration. The convention thereupon adjourned.

At the directors' meeting following adjournment besides electing the officers, as already stated, a committee, consisting of N. G. Hunter, M. Savage, C. E. Tarte, C. Y. McVey and F. B. MacKinnon, was appointed to take up, on behalf of the association, the working out of the details respecting the agreement for the use of the Bell toll lines.

Western Red Cedar Association Meeting.

The regular annual meeting of the Western Red Cedar Association was held in Spokane, Wash., on January 12, 1914. The meeting was called to order by President Culver at 10:45 a. m. with all members, except one, represented.

The minutes of the previous meeting were read and approved, after which President Culver presented his annual address, which was as follows:

This association is the successor of the Idaho Cedarmen's Association, which was organized January 3, 1906, by three cedar dealers who are still members.

The chief reason for the formation of this association was the making of a set of rules covering the specifications of standard cedar poles, which was immediately consummated. With slight changes, the original specifications are universally used throughout this section and acceptable generally to the various construction companies.

In August, 1908, the association initiated a movement to obtain application of the lumber rate to cedar poles, at that time the pole rate being 10 cents per hundred pounds in excess of the lumber rate. After several months' continuous effort by our organization, and the personal efforts of various members, the railroads granted our request, thus enabling producers to increase their sales in competitive territory, thereby stimulating the pole business in this locality.

At our annual meeting in 1913, the present title of our association was adopted, that the name might be more representative of the district in which our products originate.

During the first half of the year, poles, posts and piling moved freely at fair prices. A general recession of trade during the latter half of the year has taken place, and today the industry is in a very unsatisfactory state. Your president believes, however, that very shortly a more healthy condition of affairs will prevail.

Stocks are not overly large and fairly well assorted. It is expected the output during the present winter will be greatly restricted. Owing thus far to lack of snow, practically no stock has been hauled. In addition, owing to the poor market in the latter part of the year, the usual preparations for cedar production were not undertaken. Another factor tending toward curtailment is the lack of activity by the sawmill companies, which annually produce considerable cedar which they find mixed in with their saw timber.

It is understood that cedar dealers in Michigan, Wisconsin and Minnesota are suffering from somewhat similar climatic conditions; therefore, the general outlook at this time would indicate a lesser output than for several preceding years.

That we may bear in mind the extensive use of poles for conveying electricity, let me remind you that in the United States there are over 800,000 miles of pole lines, there being in service today over 32,000,000 poles. The annual renewal requirements are over 4,000,000, and of these large totals it is claimed over 65 per cent are cedar.

We may have some confidence in predicting a fair movement of our commodity during the coming year, based upon the following: Tariff and currency bills are generally satisfactory and out of the way. Some additional trust legislation will no doubt be enacted by the present Congress, and we are led to believe it will tend to clarify the Government's position by defining limits in which large business can be conducted legally and without molestation.

The general opinion is that Eastern railroads will soon be permitted to advance their freight rates 5 per cent, thus enabling them to more readily market their securities and expend large sums for betterment. Your president would urge upon the members the importance of shipping stock fully up to grade. Some of us are not always particular to have a competent inspector at the loading point. A good pole is a good advertisement; while a poor one may lose a customer and cause oceans of trouble.

We should also use our utmost efforts to have the National Electric Light Association adopt our specifications for cedar poles. Large quantities of poles are purchased annually under specifications of the association; the advantages therefore of the desired action are obvious. It might prove profitable to ascertain if all Pacific Coast and Canadian cedar dealers are thoroughly familiar with our specifications and are using same.

The Forest Products Exposition will be held in Chicago, April 30 to May 9, inclusive, and in New York from May 21 to May 30. A display of Western cedar at these expositions would no doubt prove a great advantage to our industry.

A short discussion followed the reading of the address, in which E. A. Lindsley, of the Lindsley Brothers Company, spoke briefly on the importance of having an exhibit at the Forest Products Exposition to be held in Chicago and New York. Mr. Lindsley stated that he had taken the liberty of reserving a space at the Exposition with the understanding that if the

Western Red Cedar Association did not care to have an exhibit, the Lindsley Brothers Company would.

The report of the secretary and treasurer was read, showing a substantial balance on hand in the treasury.

The Committee on Constitution and By-Laws, consisting of W. M. Leavitt, of the National Pole Company, E. A. Lindsley and President Culver, reported that they had prepared a constitution and by-laws as ordered, which they presented. Various amendments were offered and after a lengthy discussion they were adopted as amended.

The matter of an exhibit at the Forest Products Exposition in Chicago was then taken up and after a short discussion, E. T. Chapin, of the E. T. Chapin Company, moved that a committee of three be appointed by the chair to devise ways and means and make all arrangements for an exhibit at the Exposition, at an expense not to exceed $1,200.

The election of officers and directors was carried out as provided by the new constitution, and M. P. Flannery, vice-president of the association during 1913, was unanimously elected president.

W. M. Leavitt, western manager of the National Pole Company, was elected vice-president.

R. C. Jones, of the Lost Creek Cedar Company, H. C. Culver, of the Sandpoint Lumber & Pole Company, and E. T. Chapin were elected directors of the association for the year 1914.

The following committees were selected by the Board of Directors:

Pole Committee: C. P. Lindsley, chairman; W. M. Leavitt, M. P. Flannery.

Post Committee: Frank Culver, chairman; L. D. MacFarland, M. Stewart.

Piling Committee: H. C. Culver, chairman; G. E. Merrill, E. T. Chapin.

Railroad Committee: G. C. MacDonald, chairman; W. G. Chaney, L. H. Clark.

Forest Products Exposition Committee: E. A. Lindsley, chairman; E. T. Chapin, W. M. Leavitt.

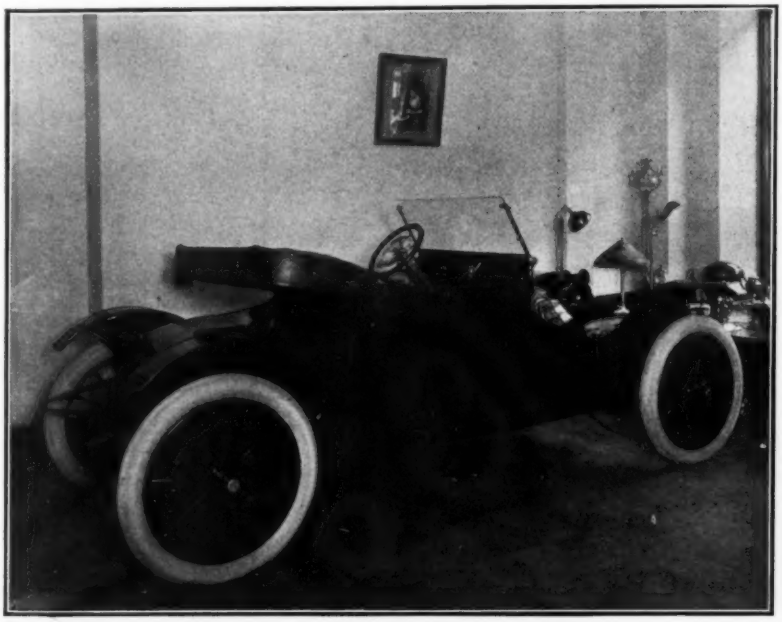
Inspection Commitee: C. P. Lindsley, chairman; Frank Culver, H. C. Culver.

The Board of Directors elected R. L. Bayne, of the Lindsley Brothers Company, as secretary and treasurer for the year 1914.

A motion was made that a vote of thanks be extended to the retiring president, H. C. Culver, for the efficient work he had done during the year 1913. This was unanimously carried.

After a short discussion the Commitee on the Forest Products Exposition was instructed to take up with the National Electric Light Association the matter of having specifications for Western red cedar poles adopted by that association. At the present time the National Electric Light Association has specifications covering yellow pine poles, Eastern white cedar and chestnut poles, but have none covering Western red cedar. It is the belief of the association that the Western red cedar poles are far superior to any of the other three now covered by the specifications of the National Electric Light Association, and it is therefore hoped that during the year 1914 specifications will be adopted by the National Electric Light Association for the Western poles.

Those present at the meeting were: M. P. Flannery, B. J. Carney & Company; G. U. Bacon, B. J. Carney & Company; W. G. Chaney, W. G. Chaney & Company; E. T. Chapin, E. T. Chapin Company; C. P. Lindsley, The Lindsley Brothers Company; R. L. Bayne, The Lindsley Brothers Company; R. G. Jones, Lost Creek Cedar Company; W. M. Leavitt, National Pole Company; L. D. McFarland, Northern Mercantile Company; G. E. Merrill, Pacific Fir Company; H. C. Culver, Sandpoint Lumber & Pole Company; E. F. Hitchner, Sandpoint Lumber & Pole Company; Louis Crombie, The Valentine-Clarke Company; G. C. McDonald, Western Lumber & Pole Company.



Bailey Electric Roadster Exhibited in New York.

Bailey Roadster Exhibited in New York.

To the number of automobile shows which kept New York busy for two weeks, still another was opened Monday evening, January 5, in the Forty-second Street showrooms of The New York Edison Company, where the Bailey electric roadster was displayed from January 5 to 10 inclusive, under the auspices of the New York Electric Vehicle Association.

The 1914 model roadster made the trip down from Boston, and had to be taken apart and reassembled, in order to get it in the Edison showroom.

To get the Bailey car through the narrow doorway, the body was removed, the batteries taken out and the car turned on its side. Then the car was put together again before the eyes of an interested crowd. This little electric roadster made its way down from Amesbury, Mass., to New York through the severe weather of January 3 and 4 without mishap of any kind. It is the same type of electric that did the run from Boston to New York last fall in eleven hours running time, an average speed of 21.5 miles an hour, and from New York to Chicago at an average of 17 miles per hour for the entire distance.

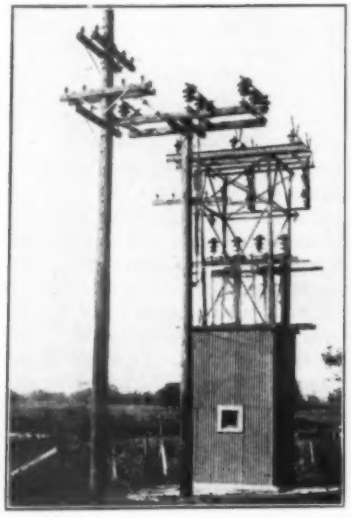
Hill climbing is another specialty of this type of electric vehicle. In 1910, to show its capacity, a Bailey car climbed Mount Washington. Last fall, the present type roadster took a trip from Boston to Burlington, Vt., crossing the main range of the Green Mountains The average speed for this trip was 19 miles an hour, well up to the average speed of powerful gasoline cars covering the same roads. For ordinary use, a distance of from 80 to 100 miles on a single charge is gauranteed, at a speed of 20 miles an hour on ordinary roads.

New Electrical and Mechanical Appliances

Standard Outdoor High-Tension Substations.

The increasing tendency toward standardization of equipment is well shown by the accompany illustration. This is a standard 22,000-volt three-phase substation manufactured by the Delta-Star Electric Company, Chicago Ill., and is shipped complete ready for erection. The central-station manager is therefore enabled to order a complete substation ready for use just as readily as a package of lamps, meters, etc., and as all parts are of standard dimensions no difficulty is experienced in erecting the equipment at a minimum expenditure.

In this substation the high-tension control and protective equipment is that known as the MRC type, the poles being either wood or steel as desired. By the use of such standard equipment the central-station manager saves considerable expense necessary in design and laying out substations for weatherproof service.



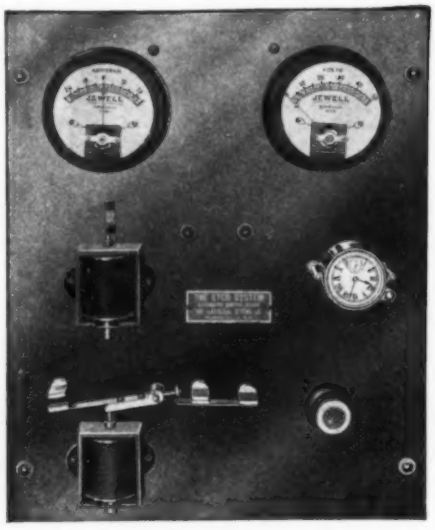
22,000-Volt Outdoor Substation.

The Etco Electric Light System.

This system, consisting of a storage-battery lighting plant with an automatic switchboard, is now being offered to the trade by the Electrical Testing Company, 350-52 Knoxville Avenue, Peoria, Ill. As the generator is nearly always belted to a large engine which is doing other work, this plant is not made self-starting because it would make an unnecessary strain on the battery.

In operating these plants it is necessary to start the engine; then the automatic switchboard places the battery on charge and throws the balancing cells in series with the lighting circuit to maintain the proper voltage. When the battery becomes fully charged the cutout acts and the charging is discontinued. This action does not stop the engine, but a small high-grade time switch in the ignition circuit can be adjusted to shut down the engine at any time.

In nearly every case the engine can be pumping water or doing other work while the battery is being charged. Should the battery become fully charged, it will be cut out while the engine will continue to perform its other work until shut down by hand or by clock.



Switchboard Panel for Light Plant.

Due to the automatic features it is not necessary to install the plant all in one place. The generator can be installed in a shed or shop with the engine, the battery in the basement and the switchboard in any convenient place. It is said that perfectly steady light can be obtained with this system from the generator at the same time that the batteries are on charge. This can be accomplished with practically any style of gas, oil or gasoline engine.

Demonstration of Inherent Regulation for U-S-L Electric Starter and Lighter.

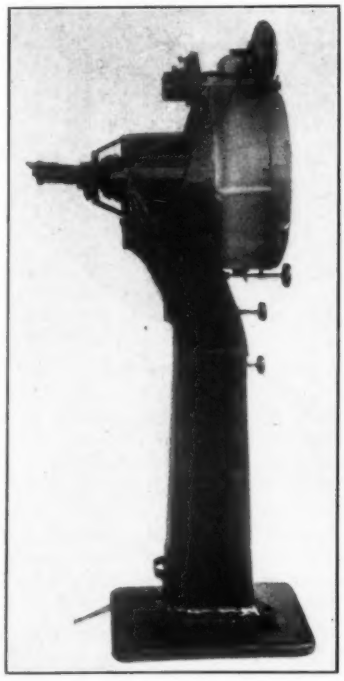
The United States Light & Heating Company, of Niagara Falls, N. Y., is making a special effort to demonstrate clearly and forcibly at the various automobile shows the system of inherent regulation used with the U-S-L electric starter and lighter, which was described in our issue of January 10, 1914. Inasmuch as this method of controlling the generator output secures practically ideal action without the necessity for any regulating apparatus whatsoever, automobile engineers and the automobile-buying public in general are deeply interested in its operation.

Demonstrator of U-S-L System.

In anticipation of the demand for demonstration, the company has arranged a special operating exhibit which is now being shown at its booth in the Chicago automobile show. Illustrations of this exhibit are shown herewith. The apparatus consists of a U-S-L motor-generator of the inherently regulated type driven as a generator by a small direct-connected

motor. At the top of the pedestal which supports the motor-generator and motor, is a panel carrying an ammeter and a tachometer. The ammeter shows the generator current output and the tachometer revolutions of the generator per minute.

The motor develops one horsepower at 2,000 revolutions per minute. Its speed during demonstration is over 2,000 revolutions per minute at times, which, of course, is in excess of the speed ever reached by the average automobile engine in service. The generator commences battery charging at approximately 250 revolutions per minute, and gives maximum output at 500 revolutions per minute. The generator, therefore, requires little more than one-quarter horsepower when delivering maximum energy.



Side View of Demonstrator.

To all outward appearances, the U-S-L motor-generator of the inherently regulated type is similar to the type employing an external regulator. The difference lies simply in the disposition of the field coils. The arrangement of the coils in the new type is such that the machine is self-regulating. No carbon piles or other resistances are used, and, hence, all energy waste is reduced to a minimum. The generator commences to charge the battery at an exceptionally low speed, insuring ample battery capacity for starting for even the slowest driver. All adjustments have been done away with.

Unique Power Plant for Ford Motor Company to Have Combination Steam and Gas-Engine-Driven Generators.

The Ford Motor Company, Detroit, Mich., has placed contracts for a gas-engine-driven electric power plant that will be not only one of the largest gas-engine plants in the country but will be in many respects absolutely unique. The company has appropriated in the neighborhood of a million dollars for the project, which will put into effect plans Mr. Henry Ford has long had in mind for utilizing the waste heat of the ordinary producer gas engine.

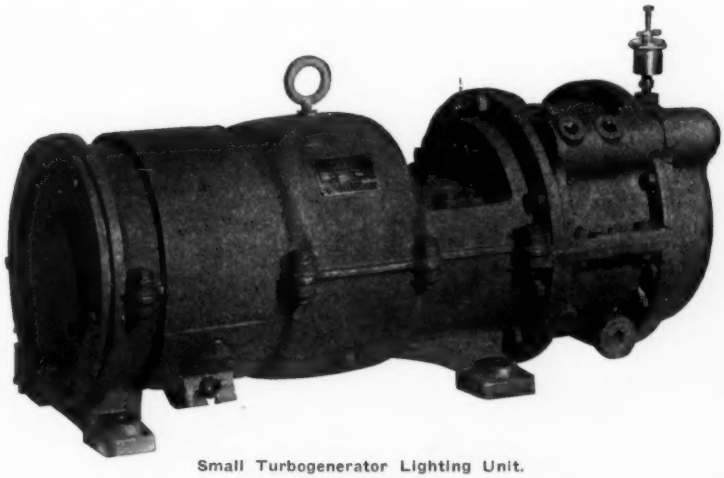
Four 6,000-horsepower Hamilton-Gray gas and steam engines of novel design will drive the same number of engine-type, direct-current generators running at 80 revolutions per minute. A plan view of each engine will be similar to a cross-compound steam engine, with two cylinders in tandem on each side. One pair of cylinders will be operated by producer gas and the other by steam. The steam will be generated from the water used in the water jacket of the gas engine, further heated by the exhaust gases and by waste heat from the producer gas plant. This water or steam will be used as the feed water for the boiler which supplies the steam-engine cylinders. A heavy flywheel will equalize the characteristics of the gas and steam-driven elements of the engine.

Each of the generators will have a normal rating of 3,750 kilowatts. These generators are designed for much higher efficiency than ordinarily found in commercial direct-current practice. Full-load efficiencies will be not less than 94.5 per cent. By these means and by the utilization of energy usually lost in waste heat, it is proposed to make the new Ford power plant the most economical in the country in respect to cost of production per kilowatt-hour. The armatures will be of split construction, which is necessitated by clearance requirements through tunnels and bridges in shipment from Ampere to Detroit, and the generators will be finally assembled at the Ford plant. These large generators will be manufactured by the Crocker-Wheeler Company, Ampere, N. J.

A One-Kilowatt Turbogenerator Lighting Unit.

Light is frequently wanted in limited areas where steam is available but suitable electric power is not, as on contracting operations, small industrial plants, steam launches, etc. To provide a means for supplying electric light under such circumstances, the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has recently put on the market a small turbogenerator which will operate an arc lamp and a few incandescents at the same time, or about forty 25-watt Mazda lamps, or their equivalent, alone.

This unit is very compact, being only three feet long and one and one-half feet high, and can be installed anywhere, provided the unit is kept horizontal. It requires practically no attention when operating; there are no delicate adjustments to make; and all parts are easily accessible.



Small Turbogenerator Lighting Unit.

The turbine and generator are mounted in the same frame. The turbine is of the impulse type and has a governor which keeps the speed uniform for all variations of load and steam pressure. The full rating of one kilowatt will be developed on 90 pounds steam pressure, and satisfactory operation can be obtained with pressures up to 250 pounds. The weight is 283 pounds. The rated voltage of the generator is 120 volts.

The Utah copper output, which has broken previous yearly records, reached 137,307,485 pounds in 1912 and slightly over 158,200,000 pounds in 1913, an increase of about 15 per cent.

Unit-Type Laboratory Wheatstone Bridges and Resistance Boxes.

A short time ago there was described in these pages a new type of portable Wheatstone bridge testing set of the dial type, introduced by the Leeds & Northrup Company, of Philadelphia, Pa. The particular advantages of this set, as claimed, were small size, light weight, low price and the fact that the dial contacts were all inside of the containing case and thus protected against dust and dirt. The success of this instrument and the wide sale which it has already had has led the company to place on the market a laboratory type of Wheatstone bridge of similar construction and laboratory resistance boxes with two, three or four dials. The method of construction of these instruments has made it possible to supply laboratory equipment of the dial type much cheaper than similar instruments of the plug decade type. The unit-type Wheatstone bridge, as it is called, is shown in the illustration herewith.

Dial Decade Type of Wheatstone Bridge.

Dial Decade Type of Resistance Box.

The advantages of the dial type Wheatstone bridges and resistance boxes over similar instruments of the plug type may be briefly stated as follows: First, facility of manipulation; second, elimination of delay and inconvenience caused by loss of plugs when using the plug type instruments; third, greater ease in keeping the contacts clean.

In regard to these particular instruments the Leeds & Northrup Company makes the following claims: In the Wheatstone bridge the ratio coils are guaranteed accurate to within one-twentieth per cent and the rheostat coils to within one-tenth per cent. In the resistance boxes all coils are guaranteed accurate to within one-tenth per cent. All resistance values are adjusted in the company's laboratories to twice their guaranteed accuracy. All coils are wound upon metal spools, thus eliminating the possibility of change in the resistance values of the coils, due to change in physical dimensions of the spool, as may happen in the use of wooden spools.

As will be noted from the illustration, the dial contacts are all mounted within the box and are therefore protected from dust and dirt. Furthermore, the contacts are inverted and therefore should dust get into the box it cannot gather upon the contact surfaces. They are, however, easily accessible for cleaning.

The switches are made of three leaves of phosphor bronze, each having independent bearing upon the contact plates. The ends of the switches are bent so that they do not lie tangent to their path of travel, thus eliminating the possibility of wearing rings in the contact plates.

Attachment Plugs for Metal Molding.

In keeping with its policy of developing new fittings and appliances to extend the usefulness of its metal molding, the National Metal Molding Company, Pittsburgh, Pa., has placed on the market two new attachment plugs. Of these the No. 360 attachment plug is made to be mounted directly on "National" metal molding and is provided with a base plate having an ear that blanks the molding opening at one side of the porcelain base, thus making these fittings all "dead end" in style. They may easily be converted into the continuous type by twisting off this ear with a pair of pliers. The No. 390 attachment plug can not be mounted directly upon the molding but is made for use with a special porcelain subbase where it is necessary to mount an attachment plug at an elbow, tee or crossover in the molding. These two fittings are also furnished with a composition cap.

Attachment Plugs for Metal Molding.

New Building in Pittsfield Plant.

The General Electric Company is preparing plans for a new building in addition to its plant in Pittsfield, Mass., which will be larger than any now standing there. The cost will be about $500,000, and the structure will be five stories in height. It will be used for small-transformer work. Despite the local rumor that many employees would be laid off two weeks ago, only about 50 hands were laid off at the Pittsfield plant.

Swiss-English Telephone Service.

The Swiss Federal Council has approved the agreement entered into by the Swiss telephone authorities and the telephone authorities of England and France for the establishment of better service between Switzerland and England by way of Paris. The present arrangement of using double relay stations provides satisfactory temporary connections only between London on the one side, and on the other, Basel by way of Paris and Belfort, Lausanne by way of Paris and Dijon, and Geneva by way of Paris and Annemasse or Lyon. The connections between other Swiss and English points have been unsatisfactory.

The new day rate for a three-minute conversation with London is $1.74, and the night rate is $1.04.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

FORT DODGE, IOWA.—The City Council will expend $80,000 for transformers.

SINGER, LA.—Dr. J. W. Brown will construct an ice and electric light plant here.

VALLEY JUNCTION, IOWA.—Street lamps will be installed in this city. Address the city clerk.

PT. ANGELES, WASH. — The Olympic Power Company has been granted a franchise in this city.

WILLIAMSBURG, VA.—The City Council is planning to construct an electric power plant at this place.

STERLING, NEB.—Mr. Marks, of Wymore, Neb., is planning to construct an electric-lighting plant at this place.

HAZELTON, N. D.—An electric light plant will be established here and electric lighting installed. Address the city clerk.

SAN ANTONIO, TEX.—A better lighting system will be established here. Address Mayor Brown for information.

ELK POINT, S. D.—The Council is considering ways and means to install a municipal light plant. Address the city clerk.

BAUDETTE, MINN.—Eight thousand dollars will be expended for an electric light plant here. Address the city clerk.

TECUMSEH, MICH.—A municipal lighting system will be established here. Address the city clerk in regard to this project.

WAYCROSS, GA.—The Hebard Cypress Company will establish an electric power and light plant here at a cost of $80,000.

RICHMOND, IND.—Mayor William J. Robbins has announced that a new street arc-lighting system will be installed at this place.

CAMPBELLSVILE, KY. — The Campbellsville Public Utilities Company is planning to construct an electric-light plant here.

ALBION, MICH.—The Commonwealth Power Company's plant, which was recently destroyed by fire, will be rebuilt at an early date.

BELLEVILLE, ILL.—Definite steps are being taken towards establishing "White Way" lighting along the two principal downtown streets.

BRISTOL, PA.—The Public Welfare Association is arranging for the purchase of a pulmotor, to be presented to the Borough, for public service. A.

DELL RAPIDS, S. D.—Bonds have been voted for the construction of an electric light system at this place. Address the city clerk for particulars.

LAWRENCE, KANS.—A "White Way" to extend for five blocks on the main business street of Lawrence is expected to be installed soon.

RUSK, TEX—The Rusk Light & Power Company has increased its capital stock from $10,000 to $20,000 and will enlarge and improve its electric light plant here. D.

PLEASANTON, TEX.—The Pleasanton Ice & Electric Light Company is expending $5,000 in installing new machinery and enlarging and improving its plant here. D.

BLOOMINGTON, NEB. — Bloomington voted upon the proposition of issuing bonds amounting to $8,500 for an electric-lighting system which carried by a large majority.

FT. WAYNE, IND.—The Board of Public Works is planning to extend the lighting plant here. Address F. E. Singrey, chairman of the Board of Works, for particulars.

CLEBURNE, TEX.—The Cleburne Street Railway is planning to erect a large power plant. A site is being searched for and other preliminary arrangements are being made.

LOS ANGELES, CAL.—The Southern California Edison Company is doing preliminary work, preparatory to establishing two additional generating plants in San Bernardino County.

WACO, TEX.—The Texas Power & Light Company will erect a power plant at this place in the near future at a cost of $200,000. Machinery costing about $800,000 will be installed.

LA CENTER, KY.—This place is considering establishing an electric-light plant, in connection with other public utilities. The mayor may have information concerning the project.

BREWTON, ALA.—$12,000 in bonds has been voted for the construction of an electric light plant here. Address J. B. McCrary, engineer of Atlanta, Ga., for further particulars.

MARTINSBURG, W. VA.—The Martinsburg Power Company will enlarge its power plant at this place so as to provide electricity for the proposed railway between Martinsburg and Hagerstown, Md.

PHILADELPHIA. PA. — Harmon Dyer, Fifth and Walnut Streets, is preparing plans and specifications for a one-story electric power plant to be erected at Pottsville, Pa., for supplying factories with power. N.

MINNEAPOLIS, MINN.—A special Council Committee is considering a plan of assessing the cost of ornamental street lighting to the benefited property owners. Address Alderman William for particulars.

LEXINGTON, KY.—This city may require the public service corporation to construct underground conduit systems in the congested district for the purpose of reducing the fire hazard caused by overhead wire. G.

HOOD RIVER, WASH.—The Odell Development League has appointed a committee to secure an engineer to make estimates as to the cost of constructing a power plant. Address Mark Cameron for information.

SIBLEY, IOWA.—The proposition for a municipal electric lighting plant in Sibley carried by a large majority. Bonds to the amount of $18,000 were voted. Immediate steps will be taken for the installation of the plant.

TUCSON, ARIZ. — The Federal Light & Power Company has announced that it will make extensive improvements in its local lighting system and street railway equipment, involving an expenditure of about $200,000.

CENTRALIA, WASH.—The Commissioners of Thurston County have granted the Washington Public Service Company a franchise to install a system of electric light and power lines in the southeastern portion of the county.

CARROLLTON, KY.—This city will purchase a new boiler, a new alternating-current generator and a new switchboard, The purchases will be made within the next 90 days. Address R. L. Bartlett, superintendent, for further information. G.

MARYVILLE, TENN. — The Aluminum Company of America, which is to receive power for the operation of its plant from the Tennessee Power Company, will put up a power plant of its own to be used for emergency purposes, it is stated. G.

JEFFERSON, KY.—This place is considering plans for providing an electric-light system, and will take bids on the installation and maintenance of street-lighting equipment in the near future. Dr. D. A. Floore is chairman of the board of trustees. G.

ZANESVILLE, O.—In order that the New Concord Water & Power Company may carry out proposed improvements the State Utilities Commission has granted permission to issue $17,000 20-year six-per-cent bonds to be sold at not less than 90 per cent.

GLEASON, TENN.—The Gleason Light Company is being organized for the purpose of furnishing light and power for this town and vicinity. A number of contracts for lighting have already been signed and an ice plant will be run in connection with the power station.

PORTLAND, ORE.—City Auditor Barbour has been instructed by the City Commission to advertise for bids for the installation of a new lighting system in the city hall. Plans and specifications have been prepared and may be obtained from Electric Inspector Plummer. O.

CENTRAL CITY, KY.—Plans for the establishment of a large power plant here to be used for the operation

of a traction line from Central City to Greenville and Drakesboro, Ky., are being made. An application for a franchise has been made to the City Council. Eastern interests are said to be behind the project. G.

HARLAN, KY.—Mine owners here are considering establishing their own power plant, on a co-operative basis. The plant would be built at Harlan and would provide current for the operation of mines in the Southeastern Kentucky field. The Kentucky Utilities Company, at Lexington, has plans for a similar proposition. G.

MORRISTOWN, N. J.—The Morris Electric Company will build a new transmission system from its Whippany-Boonton lines at Monroe to the plant of the Hanover Brick Works at Whippany. This company has entered into a contract with the power company for electric power and will convert its plant from steam to electric operation. A.

PITTSBURGH, PA.—In an opinion just handed down by Judge Cohen, the Duquesne Light Company will be compelled to place its wires underground in Main Street, Steuben Street and Park Way. A city ordinance provides that wire must be underground on these streets and the electric company had endeavored to have the ordinance declared void. S.

MORRISTOWN, N. J.—The Jersey Power Company of Boonton has made application to the Board of Public Utility Commissioners for permission to issue securities for $75,000, to be used for extensions in its system. The company plans for the construction of a transmission line from Boonton to Dover, and other improvements. A.

MT. VERNON, WASH. — The Pacific Northwest Traction Company will extend its lighting service to supply the residents along the McLean Road, from Mt. Vernon to La Connor. Engineers of the company have completed the preliminary survey, and in all likelihood the installation of light and power lines will be made in the immediate future. It is rumored that the company has under consideration the power plant at La Connor. O.

GREENFIELD, MASS.—Plans for the construction of a 35,000-kilowatt hydroelectric plant for the Turner's Falls Company are being worked out, and it is anticipated that work on the hydraulic features will be undertaken in a few months and that the station will be in operation in about two years. The projected plant will be at Turner's Falls, on the Connecticut River, about 1.5 miles below the present station. There will be a head of 54 feet available. W.

TACOMA, WASH.—Commissioner of Light Nicholas Lawson will receive bids in connection with the installation of the $36,000 cluster-lighting system as follows: 31,500 feet of No. 8 5,000-volt steel-taped cable; 2,500 feet No. 10 Duplex 5,000-volt cable; 252 6.6-ampere inverted luminous-arc lamps; 246 metal lamp posts; 225 series cutouts, 15,000-volt insulation; 5 6.6-ampere series-arc mercury-rectifier sets, without switchboard panel. Each bidder may bid on any or all of the units. The closing date has not yet been announced. O.

PORTLAND, ORE.—Guy W. Talbot, president of the Portland Gas & Coke Company, and of the Pacific Power & Light Company, here, has announced that these public service corporations will expend for improvements and betterment during 1914 a total of $547,000. Of this, the Gas Company will spend $352,000, the Pacific Power & Light Company, $155,000, while an appropriation of $40,000 has been made for equipment and improvements on the Walla Walla Railway, a subsidiary of the latter concern. O.

SEATTLE, WASH.—The County Commissioners of King County recently granted a third franchise on suburban territory for electric light and power purposes to the Puget Sound Traction, Light & Power Company, which now possesses authority to occupy the suburban field on all sides of Seattle, except on the Elliott Bay side. Officials of the company announce that work of development will commence soon. The latest franchise granted empowers the company to set poles on 50 county roads, and 50 flats in the territory between Bothell on the north, and Bellevue and Medina on the south, and Lakes Sammamish and Washington, on the east and west. The company is granted authority to string wires for telephone, telegraph, electric light and power purposes, and enjoy the privilege of a franchise for 38 years.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

BALDOCK, S. C.—The Baldock Telephone Company, has incorporated with Wick Ashe, president.

KENOSHA, WIS.—The estimated cost of rebuilding the Kenosha Home Telephone Company line is $60,000. C.

RIVERSIDE, CAL. — The Pacific Telephone & Telegraph Company has been granted a one-year franchise to operate in this city.

GRAND MARAIS, MINN.—Lake Shore Telephone Company has been organized with a capital of $50,000 by F. E. Bell and others. C.

BOTTINEAU, N. D.—Turtle Mountain Farmers Telephone Company has been incorporated with a capital of $15,000 by John A. Frederickson and others.

YELTON, OKLA.—Honzel Telephone Exchange has been incorporated with a capital of $340 by Larkin Haynes, Otto Stanley and Paul Ritter, all of Gate. P.

MIAMI, FLA.—The Miami Telephone Company, will erect a three-story exchange building here and operating boards costing $4,000 will be installed.

TOMBALL, TEX.—The Tomball Spring Telephone Company has been incorporated with a capital stock of $15,000 by J. J. Trichel, F. F. Trichel and others.

ELM GROVE, OKLA.—Farmers Mutual Telephone Company has been incorporated with a capital of $1,000 by Tom Green, A. H. Ezell and R. H. Gasswint, all of Chester. P.

OKLAHOMA CITY, OKLA. — Pleasant Hill Telephone Company has been incorporated with a capital of $375 by C. H. Keller, O. Hartwell and J. J. Coltrans, all of Oklahoma City.

CHEHALIS, WASH.—The Lewis County Commissioners have granted a telephone franchise to the Boistfort Telephone Company to operate its lines over the county roads west of this place. O.

OKLAHOMA CITY, OKLA.—Lone Elm Farm & Telephone Company of Perry has been incorporated with a capital stock of $1,000 by Peter Ewry, John W. Ruth, John Ritthaler, all of Perry. P.

NASHVILLE, TENN.—Silver Point Home Telephone Company has been incorporated with a capital of $1,000 by J. M. Johnson, L. D. Burton, W. E. Jones, William Julian and G. B. Lafever.

DOUGLAS, ARIZ. — This city is soon to have direct telephone connection with the southern portion of the Sulphur Spring Valley, the line to be constructed by the Mountain States Telephone Company.

NEW BRUNSWICK, N. J.—The New York Telephone Company has made application to the Board of County Freeholders for permission to construct new lines in Piscataway and Woodbridge Townships. A.

SCRANTON, PA.—Announcement is made that the Lackawanna Railroad will extend its wireless system, now in operation between this place and Binghamton, N. Y., to Port Morris, N. J., and westward to Bath, Pa.

OKLAHOMA CITY, OKLA.—An Oklahoma charter has been issued to Fargo Telephone Exchange of Fargo, capitalized at $3,000. The incorporators are O. J. Schliecker, N. C. Schliecker and W. J. Driskell, all of Fargo. P.

BARTLESVILLE, OKLA. — The Pioneer Telephone & Telegraph Company has made an appropriation of $40,000 for repairs and extensions on its Bartlesville plant. Most of the money will be expended in placing wires in cables or underground. P.

JOB, W. VA.—Elkins-Dry Fork Telephone Company has been incorporated with a capital of $5,000. The incorporators are C. S. Armentrout, Hoton; B. Y. White, Job; R. U. Harold, Malmon; William M. Flint, Bowden, and E. H. Arnold, Elkins.

TRANQUILITY, CAL.—The San Joaquin Valley Telephone Company has applied to the Railroad Commission for permission to issue capital stock in the sum of $10,000, of which $7,500 is to be given in exchange for the telephone system of the San Joaquin Valley Farm Lands Company, and the remainder to pay for improvements and extensions to the systems.

PASCO, WASH.—Farmers living above Pasco on the irrigated farms have organized a company to install a telephone system. Stock in the company is to be subscribed by those located in that part of the district. George H. Reasoner, here, is president, and J. H. Sylvester, secretary-treasurer. The Chamber of Commerce of this city has endorsed the movement, and a petition has been circulated among local business men to assist in the construction.

FORBES, MINN.—Forbes Rural Telephone Company has been incorporated and will engage in a telephone business with headquarters at Forbes, and connections with Clinton, Nichols, Fayal, Mesaba Mountain, McDeavitt and several unorganized townships. The company has been capitalized at $5,000. The incorporators are A. P. Quaal, Severin Johnson, J. Mobroton, Jacob Peterson and Patrick Cobb, all of McDeavitt, and Charles Borg and Gust Lind, of Clinton.

ELECTRIC RAILWAYS.

(Special Correspondence.)

BLAINE, WASH. — The Blaine-Lynden Electric Railway Company has been organized to build an electric line between Blaine and Lynden.

ATLANTA, GA.—The Georgia Railway & Power Company will build an electric railway on Howells Mill Road. Address Preston S. Arkwright, president.

ALTOONA, WIS.—A franchise has been granted to the Chippewa Falls Alley Railway Light & Power Company. Address C. M. King, mayor, in regard to the matter.

SHELBYVILLE, KY. — The Business Men's Club reports that Eastern interests are considering financing the construction of a traction line from Shelbyville to Frankfort, Ky. G.

SAUSALITO, CAL. — The Marin County Electric Railway has filed articles of incorporation with a capital stock of $100,000. The directors are B. F. Ames, A. Harper and W. W. Hicks.

COLUMBUS, KAN.—Petitions have been presented to the City Council for an election on issuing $10,000 bonds as a bonus to the Kansas Central Traction Company for building an interurban between Altamont and Columbus.

EVANSVILLE, IND.—The Evansville & Olney Traction Company is planning reorganization and the construction of a line from Evansville to Olney, Ill. This plan involves the construction of a bridge over the Wabash River at Mt. Carmel, Ill. G.

WOODSFIELD, O.—Monroe County capatilists are seriously considering the advisability of building a new electric line from Woodsfield through Barnesville to Cambridge. Estimates have already been secured on the cost of constructing such line. R.

YOUNGSTOWN, O.—The survey for the new interurban line from New Castle to Ellwood City is completed and Mahoning Valley Company officials are seeking the necessary rights of way and franchises. The new line will be part of the Mahoning Valley Railway Company. Its construction will be rushed. R.

SACRAMENTO, CAL.—The Railroad Commission has granted permission to the Sacramento Valley Electric Railroad Company to construct the first unit of its projected electric railway from Dixon due south 12.5 miles to a connection with the Oakland, Antioch & Eastern Railroad. The estimated cost of the road is $228,000.

NASHVILLE, TENN.—The Louisville & Nashville Railroad Company is reported to be planning the electrification of its Gallatin-Scottville branch in Southern Kentucky. A trolley system will probably be used, as plans are being made to secure current from the Scottville Electric Light Company. An extension of the line to Glasgow, Ky., is also contemplated. G.

BARBER, IDAHO.—Officials of the Idaho Traction Company assert that an interurban line from Boise to this city is to be built in the immediate future, and that the line will be completed and in operation before the close of the year. Tentative plans for the extension have been made. It is the present understanding that the line will be extended from South Boise to this city, a distance of 4.5 miles. Ultimately, the Idaho Traction purposes building a line west from Caldwell to Payette and Weiser. O.

CENTRALIA, ILL.—Articles of incorporation have been filed by the Illinois Counties Railroad Company. The object of the corporation to build an interurban line from Irvington in Washington County to Salem through Centralia, Central City, Junction City, Sandoval and Odin. The capital stock is $300,000. The incorporators are G. E. Eis, H. A. Warner, E. E. Fyke, H. M. Warner and F. L. Pfeiffer, all of Centralia.

TACOMA, WASH.—There are indications that the Canadian Pacific Railway is preparing to carry out its long-planned project of operating electric trains from Vancouver, B. C., through Bellingham, Everette and Seattle to Tacoma, 180 miles and eventually to Portland, Ore., 140 miles further. Stone & Webster, of Boston, who control the street railways of Tacoma, Seattle, Everette and Bellingham, are understood to be closely allied with the Canadian Railway in the Puget Sound undertakings.

HARRISBURG, PA.—The Sewickley & Edgeworth Railway Company, backed by some of the richest men in Western Pennsylvania, has been chartered in Harrisburg, with a nominal capital of $12,000. The promoters have a plan to connect the Coraopolis terminal of the Pittsburg Railways company with the trolley line at Leetsdale, Pa., thus establishing continuous electric railway service between Pittsburgh and all important points in Ohio and Indiana. The fashionable borough of Sewickley has for more than 20 years kept the trolley car outside its limits. It is planned now to move the Pennsylvania railroad tracks to the bank of the Ohio River and let the trolley line operate over the present railroad right of way. If this can be arranged Sewickley's Council will give the trolley road a franchise. The project involves the expenditure of several millions.

NEW PUBLICATIONS.

MUNICIPAL OWNERSHIP CARTOONS.—The Municipal Ownership Publishing Company, 17 East Thirty-eighth Street, New York City, has published a collection of cartoons by E. W. Kemble, accompanied by limericks by G. Mayo. These aim to put municipal ownership in a ridiculous light and point out the reasons for its failure.

RAILWAY HANDBOOK.—The General Electric Company, Schenectady, N. Y., has published a Railway Handbook for 1914. This is of pocket size and contains much general information as well as material that will be of interest and value to those connected with electric railways. There are also a number of pages in the back for notes. It is bound in flexible leather.

PROPOSALS.

ELECTRIC WIRE AND CABLE. —Sealed proposals will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until February 3 for large quantities of electric wire and cable, for delivery at the Navy Yard, Brooklyn, N. Y., as per Schedules 6272 and 6273.

ELECTRIC-LIGHT PLANT. — Bids will be received on February 3 for installing an electric-light plant in the courthouse, for a set of storage batteries, also for required number of chandeliers, switches, lamps, globes, etc. Address W. E. Paulson, county auditor, Minnewaukon, N. D.

ELEVATOR PLANT.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until February 16 for an elevator plant in the post office at Denver, Colo., in accordance with drawings and specifications, copies of which may be obtained from the Supervising Architect.

SWITCHBOARD.—Bids will be received January 27 for furnishing all labor and materials and installing one 14-circuit switchboard and one 20-circuit protector board, together with batteries and battery racks. Address Joseph G. Schuler, superintendent Department of Fire and Public Property. Wilkesbarre, Pa.

ELECTRIC WELDING OUTFIT. —Sealed proposals will be received at the office of the General Purchasing Officer, Isthmian Canal Commission, Washington, D. C., until February 7 for furnishing electric welding outfit, etc., as per Canal Circular No. 823, copies of which may be obtained from any of the Assistant Purchasing Officers located in the large cities.

CONDUIT AND WIRING. — Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until February 17 for furnishing a conduit and wiring system and lighting fixtures at the post-office at Sedalia, Mo., in accordance with drawing and specifications, copies of which may be obtained from the Supervising Architect or the custodian of the site.

ELECTRICAL APPARATUS. — Sealed proposals will be received at the office of the General Purchasing Officer, Isthmian Canal Commission, Washington, D. C., until February 3 for furnishing motor-driven air compressors, exciter sets, autotransformers, switchboard, etc., as per Canal Circular No. 822, copies of which may be obtained from any of the Assistant General Purchasing Agents.

ELECTRICAL MATERIAL. — Sealed proposals will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until February 10 for furnishing 1,790 feet of single-conductor cable, as per Schedule 6285, and one electrically operated meat and food chopper, as per Schedule 6288, for delivery at the Navy Yard, Brooklyn, N. Y.; for three different motor-driven machines, as per Schedule 6283, for delivery at the Navy Yard, Portsmouth, N. H.; and until February 17 for furnishing 75 electric flash lamps, as per Schedule 6292, for delivery at the Navy Yard, Mare Island, Cal.; four red and green draw-bridge brass lamps, fitted for electricity; and eight brass lanterns, with red lenses, fitted for electricity, as per Schedule 6298, for delivery at the Navy Yard, Annapolis, Md.; for 200 portable telephone testing sets, as per Schedule 6301, for delivery at Eastern yards; and for four two-kilowatt transformers, 500 cycles, and 7,510 feet of interior-communication cable, as per Schedule 6301, for delivery at the Navy Yard, Brooklyn, N. Y.; and also for miscellaneous telephones and two switchboards and spare parts, as per Schedule 6302, for delivery at the Navy Yard Norfolk, Va.

FINANCIAL NOTES.

Gross earnings for December, 1913, of the several companies of the Massachusetts Consolidated Railways were $40,094, an increase of $1,388 over December, 1912.

The stockholders of the Adams-Bagnall Electric Company have authorized the issue of $300,000 seven-per-cent cumulative preferred stock, which will be taken by holders of the present $600,000 stock. The proceeds will be used to finance improvements already made.

The Utica Gas & Electric Company has sold to A. B. Leach & Company and Kean, Taylor & Company, $500,000 refunding and extension mortgage, fifty-year bonds, dated July 1, 1907. Bonds are part of an authorized issue of $5,000,000, of which $3,000,000 have already been issued.

Record gross earnings were made by the New York Edison Company in 1913. Operating revenues increased $2,000,000 or 10 per cent. The company, it is estimated, will show a balance for dividends equal to 19 per cent on its stock, all of which is owned by the Consolidated Gas Company.

John R. McCune, of Pittsburgh, has been elected a director of the Westinghouse Electric & Manufacturing Company, succeeding James S. Kuhn, and Paul D. Cravath has been elected a director, succeeding the late Anthony N. Brady. One vacancy still exists, caused by the recent resignation of Thomas W. Lamont, of J. P. Morgan & Company.

N. W. Halsey & Company, Russell, Brewster & Company and the Continental and Commercial Savings Bank, of Chicago, have purchased $500,000 first and refunding five-per-cent, 20-year bonds of the United Light and Railways Company, due June 1, 1932. The bonds are being offered at 86, to yield 6.25 per cent, and are redeemable at 102.5 and interest on any interest date on sixty days' notice.

National Carbon Company directors are asking stockholders for approval of a plan for sharing profits with employees. Stockholders are asked to set aside $500,000 of a new issue of stock to be given to its 4,000 employees, terms to be announced February 16.

The Montana Power Company has called for redemption at the Central Trust Company on March 1, the $1,496,000 first mortgage, six-per-cent sinking-fund bonds of the United Missouri River Power Company at 105 and interest. The bonds are retired in connection with the financing plan of the Montana Power Company which recently filed a mortgage to secure $75,000,000 of first and refunding bonds of which $6,000,000 have been sold to a syndicate of New York bankers.

A new corporation known as the Seven Cities Company has been organized in St. Louis with a capitalization of $250,000 stock and $250,000 bonds. The company has acquired the Russellville (Ark.) Water & Light Company and the public utility plants in Russellville, Dardenelle, Morrilton, Cabin Creek, Dover, Springdale, Fayetteville, Rogers and Bentonville, Ark. All these towns will be served from the plant of the Russellville Water & Light Company, which has a hydroelectric station on the Illinois River, in Arkansas.

A merger of the electrical properties in Newport News and Hampton, Va., under the name of the Newport News & Hampton Railway, Gas & Electric Company, with capital stock of $2,500,000, has been authorized by the Virginia State Corporation Commission. The Newport News & Old Point Railway & Electric Company some time ago acquired from receivers the rights of certain competing companies, and the whole reorganized property is now merged under one charter. It will include what were formerly the Citizens' Railway, Light & Power Company, the Hampton Roads Traction Company and the Newport News & Old Point Railway & Electric Company. It is understood that the present operating officials will continue in charge of the property.

At the annual meeting of the Columbus (Ohio) Edison Company, stockholders voted to sell the property and assets of the company to the Columbus Railway, Power & Light Company for a consideration in stocks of the latter company as provided under the merger agreement. The consolidation of all public utility properties in Columbus, with the exception of the Columbus Light, Heat & Power Company, will become effective February 2, the Columbus Edison having been the last corporation to act on the consolidation. The Columbus Light, Heat & Power Company will remain outside the merger, but its properties will be operated by the Columbus Railway, Power & Light under the existing lease to the Columbus Railway & Light Company. At the annual meeting of the Columbus Light, Heat & Power Company the board of directors identified with the Columbus Railway & Light interests retired and was succeeded by a new board representing the former officers and directors of the Columbus Public Service Company, which the Columbus Light, Heat & Power succeeded. Charles L. Kurtz was elected the new president. It is expected that after the new consolidation has been in effect for some time steps will be taken by which the Columbus Light, Heat & Power Company will also enter the merger and thus place all the public utility properties of Columbus under one owning, as well as one operating, corporation.

Dividends.

Automatic Electric Company; quarterly of one per cent, payable April 1, to stock of record January 25.

Brazilian Traction, Light & Power Company; regular quarterly of 1.5 per cent, payable February 20 to stock of record January 31.

Cambridge Electric Light Company; quarterly of $3, payable February 2 to stock of record January 20.

Chicago Railways; $4 on participating certificates, Series 1, payable February 10 to stock of record January 26, and $2 on Series 2, payable the same dates.

Columbus Railway Company; regular quarterly of 1.25 per cent on preferred stock, payable February 2 to stock of record January 15.

Commonwealth Edison Company; $2, payable February 2 to stock of record January 15.

Coney Island & Brooklyn Railroad Company; six per cent on capital stock.

Cuyahoga Telephone Company; a quarterly preferred dividend of 1.5 per cent, payable January 31 to stock of record January 15.

East St. Louis & Suburban; the regular quarterly dividend of 1.25 per cent on the preferred stock, payable February 2, to stock of record January 15.

Electric Bond & Share Company; quarterly of 1.5 per cent on the preferred stock, payable February 2 to stock of record January 21.

Federal Sign System; regular quarterly of 1.75 per cent, payable February 2 to stock of record January 2.

Fort Worth Power & Light Company; quarterly of 1.75 per cent on preferred, payable February 2 to stock of record January 20.

Grand Rapids Railway Company; regular quarterly of 1.25 per cent on preferred, payable February 2 to stock of record January 15.

Illuminating & Power Security Company; quarterly of 1.75 per cent on preferred, payable February 16 to stock of record January 15.

International Traction Company; regular semi-annual of two per cent on preferred, payable February 1 to stock of record January 24.

Jacksonville Traction Company; the regular quarterly dividends of $1.50 a share on its preferred stock, and $1.75 a share on its common stock, both payable February 2 to stock of record of January 22.

Lewiston, Augusta & Waterville Street Railway; regular quarterly of 1.5 per cent on preferred, payable February 2 to stock of record January 15.

Milwaukee Electric Railway & Light Company; quarterly of 1.5 per cent on preferred stock, payable January 31 to stock of record January 20.

National Carbon Company; quarterly of 1.75 per cent on preferred, payable February 14 to stock of record January 27.

Public Service Company of Northern Illinois; regular quarterly of 1.25 per cent on common and 1.5 per cent on preferred, both payable February 2 to stock of record January 15.

Railway & Light Security Company; semi-annual of $3 on common, payable February 2 to stock of record January 15.

York Railway Company, semi-annual of 2.5 per cent on preferred, payable January 24.

Report of Earnings.

COMMONWEALTH POWER, RAILWAY & LIGHT.		
November gross	$ 288,997	$ 149,420
Net after expenses, tax, interest	222,440	132,531
Balance after preferred dividends	142,440	102,531
Twelve months' gross.	2,210,283	1,288,633
Net after expenses, tax, interest	1,769,481	1,150,673
Balance after preferred dividends	1,059,481	790,673

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Jan. 19	Jan. 12
American Tel. & Tel. (New York)	120¼	119
Commonwealth Edison (Chicago)	134	132
Edison Electric Illuminating (Boston)	251½	247
Electric Storage Battery common (Philadelphia)	49½	48¼
Electric Storage Battery preferred (Philadelphia)	49½	48¼
General Electric (New York)	144	140½
Kings County Electric (New York)	119	119
Manhattan Transit (New York)	1⅛	1⅛
Massachusetts Electric common (Boston)	12½	12
Massachusetts Electric preferred (Boston)	64½	63
National Carbon common (Chicago)	*135	135
National Carbon preferred (Chicago)	119	116
New England Telephone (Boston)	134	135½
Philadelphia Electric (Philadelphia)	26⅜	26¾
Postal Telegraph and Cables common (New York)	78½	76
Postal Telegraph and Cables preferred (New York)	66½	65¼
Western Union (New York)	59	58½
Westinghouse common (New York)	67⅝	66
Westinghouse preferred (New York)	115¼	116

PERSONAL MENTION.

MR. CLYDE KETCHAM, Weatherly, Pa., has been appointed superintendent of the local municipal lighting plant by the Common Council.

MR. A. V. WYNNE, formerly electrical engineer of the Trumbull Public Service Company, Warren, O., has been appointed superintendent of the Masillon (Ohio) Gas & Electric Company.

MR. JAMES P. WHALLEN has been elected a member of the Board of Directors of the Louisville Gas & Electric Company. He succeeds to the place on the board held by his brother, the late JOHN H. WHALLEN.

MR. S. WOLFF, formerly manager of the Cleveland office of the Allis-Chalmers Manufacturing Company, Milwaukee, has been appointed Chicago manager for the DeLaval Steam Turbine Company, with offices in the Peoples Gas Building.

MR. H. H. CUDMORE has been unusually successful during the past few months acting as special representative of the Society for Electrical Development. In every city that Mr. Cudmore has visited there is noticeable a very enthusiastic interest in the work of the Society.

MR. E. J. STEWART, city electrical inspector of Topeka, Kans., is the author of an exhaustive and very interesting article in *The Topeka Daily Capital*, January 12, describing the electrical and mechanical features and the protective value of the electrical fuse.

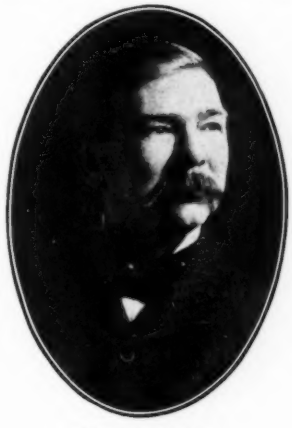
PROF. J. M. BRYANT, of the Department of Electrical Engineering of the University of Illinois, has recently been employed by three different cities of Illinois, namely, Jacksonville, Kewanee and Lewiston, as consulting engineer in connection with municipal electric-lighting work involving both technical and economic problems.

MR. CHARLES H. SEAVER has resigned his position as assistant advertising manager of the Commonwealth Edison Company and joined the advertising staff of Fairbanks, Morse & Company at its main office in Chicago. Mr. Seaver served in the General Electric Company's testing and advertising departments at Schenectady for three years. During the following two years he was an associate editor on the staff of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN. For the last two years he has assisted Mr. Dana Howard in advertising work for the Commonwealth Edison Company, Chicago.

OBITUARY.

MR. RICHARD NOTT DYER, for many years counsel for Thomas A. Edison, died at his home in East Orange, N. J., on January 13. Mr. Dyer was a member of the firm of Dyer, Dyer & Taylor, of 31 Nassau Street, New York. He was born in Calais, Me., 56 years ago, was a graduate of the Columbia University, Washington, and was admitted to the bar in Chicago in 1879. Two years afterward he became Mr. Edison's attorney in the inventor's patent suits. He won the incandescent-light case after carrying it to the United States Supreme Court. He prepared the patent papers for the phonograph, kinetoscope and other important Edison inventions. Later he became counsel for the Sprague Electric Company and for several years was in charge of the patent work of the General Electric Company. He was for several years president of the City Club of East Orange and he was a member of the Country Club, the Union League Club and the Lawyers Club of New York and the Cosmos Club of Washington. His wife, a son and a daughter survive him. He was a brother of Commodore George L. Dyer, U. S. N., retired, and of E. W. Dyer, who was formerly associated in business with Mr. Edison.

MR. EDWIN EMERSON NOLAN, head of the Materials Disposition Department of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., died at his home in Wilkinsburg, Pa., on January 13. Mr. Nolan began work with the Westinghouse Electric Company in 1887, just about the time it began operations on Garrison Alley in the city of Pittsburgh. He was subsequently made superintendent of the Allegheny factory of the company and as such had charge of building the first alternating-current generators for the Niagara plant, an installation which afterwards became famous throughout the world. In 1898 Mr. Nolan was sent by the Westinghouse Electric & Manufacturing Company to France to establish a factory at Havre, in which position he remained until 1902. At this time he returned to the United States, and on account of his familiarity with Westinghouse apparatus was placed in charge of the Materials Disposition Department, a position which he held until his death. Mr. Nolan received his early education in Mexico, and from his sojourn among the foreign population acquired a ready speaking knowledge of several foreign languages which made his services unusually valuable to the company in dealing with its numerous foreign interests. Mr. Nolan was a mechanical engineer and an inventor of considerable ability, one of his inventions being now in use on the modern street-railway motor, as manufactured by the Westinghouse Company. He was noted for his thoroughness in all undertakings, and was an exceedingly reliable and conscientious employee. His kindly disposition and method of dealing with men endeared him to the large number of acquaintances which he had made in this country and in many foreign countries. Mr. Nolan leaves a widow, two sons and two daughters. The deceased was born in Chicago, August 10, 1857.



Edwin E. Nolan.

NEW INCORPORATIONS.

CINCINNATI, O.—The Neil and Smith Electric Tool Company has been incorporated by John W. Neil and others. The capital stock is $30,000.

ONEIDA, N. Y.—The Bullock-Fortin Electric Company, Incorporated, has been incorporated with a capital stock of $2,000 by Lorenzo B. Fortin, Sheldon Bullock and George Kline, all of this city.

PHILADELPHIA, PA.—The Economic Power & Product Company has been incorporated under the laws of Delaware, with a capital of $10,000,000. George H. B. Martin, of Camden, is the principal incorporator. N.

FORT WAYNE, IND.—Fort Wayne Minature Lamp Company has been incorporated with a capital stock of $5,000 to deal in electrical appliances. The directors are Arthur G. Locke, Elsie L. Locke and Wendell C. Glass.

NEW YORK, N. Y.—Walsh Electrical Supply Company, Incorporated, has been granted articles of incorporation with a capital stock of $15,000. The incorporators are John L. Wilson, Brooklyn, N. Y.; George Kerr, Elizabeth, N. J.; and F. Elwood Hunt, of Brooklyn.

BROOKLYN, N. Y.—Bayley & Sons, Incorporated, has been granted articles of incorporation with a capitalization of $30,000 to manufacture gas and electric-light fixtures. The incorporators are George W. Bayley, Mary S. Bayley and Louise S. Bayley, all of this city.

NEW YORK, N. Y.—Curtis & Carhart, Incorporated, has filed articles of incorporation to manufacture and deal in electrical appliances. The capital stock is $10,000 and the incorporators are William F. Curtis, Benjamin I. Carhart, of New York City, and Percy Murley, of Stapleton.

DATES AHEAD.

Efficiency Society. Annual convention. New York, N. Y., January 26-27.

Western Association of Electrical Inspectors. Annual meeting, Cincinnati, O., January 27-29.

Northwestern Cedarmen's Association. Annual convention, Escanaba, Mich., January 27-28.

American Electric Railway Association. Mid-year meeting. Engineering Societies Building, New York, N. Y., January 29-31.

Wisconsin State Telephone Association. Madison, Wis., February 11-12.

American Institute of Mining Engineers. Annual convention, New York, N. Y., February 17-20.

Electrical Supply Jobbers Association. New Willard Hotel, Washington, D. C., February 17-19.

American Institute of Electrical Engineers. Annual mid-winter convention, Engineering Societies Building, New York, N. Y., February 25-27.

State Independent Telephone Association. Des Moines, Iowa, March 10-12.

Telegraphers' Mutual Benefit Association. New York, N. Y., March 11.

Buffalo Electrical Show. Elmwood Music Hall, Buffalo, N. Y., March 9-14.

Peoria Electric Show. Peoria, Ill., March 9-15.

American Railway Engineering Association. Annual convention. Chicago, Ill., March 17-20.

American Electrochemical Society. Twenty-fifth general meeting, New York, N. Y., April 16-18.

With the Electrical Manufacturers

Electric Machinery Company, Minneapolis, Minn., has sent out a number of new illustration sheets for its pictorial folder of its products. Among these are direct-current generators and motors, induction motors and synchronous motors.

The Lux Manufacturing Company, New York City, has moved into a new factory and offices at the Factory Terminal Building, Hoboken, N. J. The company will have greater facilities and the output will be improved and turned out on a much larger scale.

Westinghouse Lamp Company announces that on January 19 it removed its administrative, executive sales, treasury, auditing and purchasing departments from the former offices at Bloomfield, N. J., to the Martin Building, at 1261 Broadway (corner of Thirty-first Street), New York City.

Sundh Electric Company, New York, N. Y., has issued a number of new loose leaves for insertion in its catalog of electrically controlled devices. These deal particularly with various types of Sundh circuit-breakers and the Sundh remote indicator of the variation of liquid levels.

The Hart & Hegeman Manufacturing Company, Hartford, Conn., held its annual meeting on January 18 and elected Shiras Morris president and treasurer of the company, succeeding the late Alfred H. Pease. Charles A. Pease was elected vice-president, McKew Parr, general sales manager, and Arthur L. Shipman, secretary.

The United States Light & Heating Company has changed the location of its New York city branch sales office from 30 Church Street to 210 West Fiftieth Street. This brings the New York U-S-L service station and sales office into the same building. The general offices of the company will remain at 30 Church Street, however.

Electric Products Company, Cleveland, O., has issued a little booklet entitled "My Electric Car Simplified." This describes the various Wotton battery-charging equipments, including the guaranteed automatic rectifier, the complete charging panel, the Soakometer instrument and other devices used in making charging of electric-vehicle batteries automatic and reliable.

Pass & Seymour, Incorporated, Solvay, N. Y., has issued Bulletin 835, which is a well illustrated price list of the latest handy electrical wiring devices placed on the market by this well known firm. Among the many new devices described are fixture loops, rosettes, pendent switches, porcelain transformer cutouts, conduit clamps, attachment and test plugs, shade-holders, insulating tubes, cleats and bushings, etc.

The C. & C. Electric & Manufacturing Company, Garwood, N. J., announces that it has discontinued its Pittsburgh office, which has been in charge of Ludwig Hommel & Company; the territory heretofore covered by that office will now be taken care of by the Philadelphia manager of the company, J. C. Chamberlin. The company also states that it has appointed F. A. Saylor, with offices in the Greenwood Building, Sixth and Vine Streets, Cincinnati, O., as its agent for the southern part of Ohio.

The Allen-Bradley Company, 495 Clinton Street, Milkaukee, Wis., has published a very interesting treatise entitled "Guard the Motor," describing the type "H" alternating-current motor starters. This article, which should be in the hands of every engineer and electrician interested in the subject, is illustrated by a carefully worked up diagram showing the essential features of the motor control and explaining in detail the operation of the resistance units, switch contacts, overload relay, time-limit device, no-voltage release, operating lever, pressure equalizer and general construction. Copies of the bulletin containing this article will be sent to those interested upon request.

The Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa., has issued catalog No. 44 dealing with resistance boxes and Wheatstone bridges. This is a 32-page publication with no less than 33 illustrations. Almost half of the catalog is devoted to valuable explanatory matter that should prove of great interest to anyone making resistance measurements. Several methods of combining resistance coils are described and the advantages of each set forth. The arrangement of Leeds & Northrup decades and ratio coils is described in detail. Methods of construction of coils, plugs, blocks, dial switches, etc., are explained and the adjustment of coils made clear. Over 50 types of bridges and resistance boxes are listed, also separate standard resistances, slide-wire or meter bridges, Kohlrausch slide wires and several ohmmeters.

The Trumbull Electric Manufacturing Company, Plainville, Conn., is distributing catalog No. 10. This gives a complete descriptive and illustrated list of Trumbull knife switches, snap switches, panelboards, cabinets, switchboards, cutouts, rosettes, receptacles, service boxes, insulating joints and other electrical specialities. The reference data throughout the book are made very easy of discovery through the use of thumb indications and cutouts. In addition to this reference system there is at the back a general index, alphabetically arranged, and also a cross index giving opposite the catalog numbers the list prices, schedules, page, standard package and carton. The new catalog is somewhat larger than the last one, covering 200 pages. It represents many additions and changes to the Trumbull lines. The panelboard pages have been entirely revised and there have been a good many changes in the design and prices. There have also been added snap switches, insulating joints and other minor accessories. The catalog is handsomely printed and illustrated and is in every way a credit to the company.

The Robbins & Myers Company, Springfield, Ohio, has ready for distribution its new catalog No. 130, devoted to Standard electric fans. This is a most attractive book of 48 pages with multi-color double cover. Each page has a neat border and the two middle pages have colored illustrations of residence scenes wherein electric fans manifestly add greatly to the comfort. There are also many other illustrations of this kind, all showing the wonderful utility of a fan motor in promoting efficiency as well as comfort in a variety of cases. Valuable suggestions are given to dealers for stimulating the sales of electric fans and it is made clear that these are no longer in the luxury group, but belong to the great class of present-day necessities. Detailed and illustrated descriptions are given of the several types of ceiling fans and the many types of desk and bracket fans, oscillating and non-oscillating, that are manufactured by the company. Small exhaust fans are also described and a few hat-cleaning motors. Specifications are given for ceiling, desk and bracket fans. Direct-current fans are made in a great range of voltages. Alternating-current fans are made for 110 and 220 volts.

General Electric Company, Schenectady, N. Y., has issued a number of new publications, of particular interest being the catalog of the company's extensive line of electric fans for the season of 1914. This publication includes portable and semiportable fans for table, wall and ceiling mounting, and also small ventilating outfits. A special moistureproof fan has been made for use on shipboard; the fittings on this are made of such material as to be noncorrosive. While this bulletin, which is No. A4197, has intentionally been made free from detailed technical data so as to make it suitable for popular distribution, it contains sufficient information to enable intelligent ordering of fans to meet any requirements. The catalog is, of course, very completely illustrated. Bulletin A4199 illustrates and describes G-E railway-motor gears and pinions and gives numerous curves and data of special interest to purchasers of such material. Bulletin A4143 is devoted to belt-driven alternators, known as the form B; these machines are made in capacities ranging from 50 to 200 kilowatts. Bulletin A4189 describes direct-current three-wire switchboards for use in small plants; these are suitable for 125 and 250 volts and for plants ranging from 10 to 100 kilowatts in rating.

Record of Electrical Patents.

Issued by the United States Patent Office, January 13, 1914.

1,083,915. Timekeeper for Telephones. C. L. Braucher and E. R. Johnson, Cincinnati, O. On an inclined plate secured to a desk set is a writing pad and a stop watch.

1,083,926. Microphone. L. Ericson, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. A hand telephone set with receiver and microphone transmitter at opposite ends of the handle.

1,083,941. Control System for Electric Motors. J. S. Peck, assignor to Westinghouse Electric & Mfg. Co. A railway control system with master controller and interlocked relay-controlled switches.

1,083,945. Cooling System for Transformers. K. C. Randall, assignor to Westinghouse Electric & Mfg. Co. Outside of the casing are vertical tubes to permit the oil to cool.

1,083,950. Circuit-Controller. H. A. Steen, assignor to Westinghouse Electric & Mfg. Co. An automatic controller for a reversing motor.

1,083,956. Electric Seam-Welding. E. Thomson, assignor to Thomson Electric Welding Co., Lynn, Mass. Consists in first forming a number of spot welds along the seam and then forming a continuous seam by electric welding along the line of spots.

1,083,959. Automatic Weighing Apparatus. C. C. Voglesong, Oakland, Cal. Has an electric motor to reciprocate the feeding device, a weighing receptacle with a counterweighted and electrically released bottom, and a controller adapted to stop and start the motor alternately with the action of the receptacle.

1,083,964. Elecric Spark-Producing Apparatus. G. W. Wacker, assignor to J. S. Bretz Co., New York, N. Y. Includes means for momentarily connecting a battery to the magneto in starting the engine.

1,083,965. Engine-Starting Spark-Producing Apparatus. G. W. Wacker, assignor to J. S. Bretz Co. A modification of the above.

1,083,979. Method and Apparatus for Separating Ores or the Like. O. A. Zander, Guldsmedshyttan, Sweden. A magnetic separator.

1,083,986. Trolley Wheel. J. P. Burns, Auburn, N. Y. Has a spring collar on the shaft.

1,083,992. Apparatus for Cleaning Articles. E. L. Couch, Hartford, Conn., assignor to Silverease Co. An apparatus for cleaning tarnished silver comprises an electrolytic solution and an anode containing 40% aluminum, 40% tin, 10% lead, and 10% antimony, the silver articles acting as cathode.

1,084,012. Device for Calling Cabs, Porters, and the Like by Telephone. A. Hinzpeter, Munich, Germany. Includes time-controlled means for closing telephone apparatus against other calls after a call has been made.

1,084,040. Dynamo-Electric Machinery. A. L. J. Scherbius, assignor to General Electric Co. A three-phase commutator machine has a drum compensating winding with connections to receive the three brush currents and auxiliary poles with windings that receive the currents from the two brushes adjacent thereto.

1,084,047. Automatic Railway-Control System. C. S. Stanton, Cooperstown, N. Y. Electrically controlled system for cutting off the motive power and applying the brakes, and an alarm associated therewith and arranged to release the brake and restore the power.

1,084,059. Signaling System. C. E. Beach, assignor to G. O. Knapp, New York, N. Y. Includes a main and a number of series-connected local stations, each with a local storage battery, a special arrangement permitting charging the batteries from the line.

1,084,070. Loud-Speaking Telephone System. J. J. Comer, assignor to Automatic Enunciator Co., Chicago, Ill. Has a differential microphone transmitter with three electrodes.

1,084,077. Reversing Switch. T. Burchfield Elliott, Independence, Kans. Has two sets of contact bars and a pivoted sliding lever engaging one or the other set.

1,084,078. System of Electrical Distribution. V. A. Fynn, assignor to Wagner Electric Mfg. Co., St. Louis, Mo. Includes a main dynamo, several auxiliary machines (one of which is in opposition to the main dynamo), a storage battery and means for charging the same.

1,084,079. Dynamo-Electric Machine. V. A. Fynn, assignor to Wagner Electric Mfg. Co. A dynamo with two shunt and a series winding has means for connecting the armature and one shunt in circuit with a storage battery for running as a motor, and means for connecting the second shunt in series with the first and in opposition to the series winding for operating the machine as a generator to charge the battery.

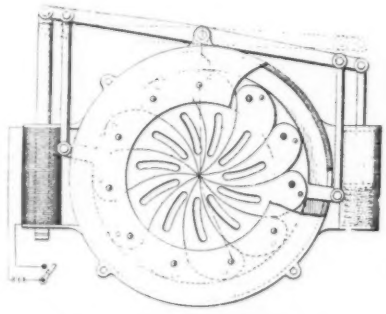
1,084,083. Welding Machine. J. H. Gravell, assignor to Hale & Kilburn Co., Philadelphia, Pa. The primary coil encircles the secondary and core; the secondary has terminals that are adjustable.

1,084,096. Ignition System for Internal-Combustion Engines. J. Marx, Hartington, Nebr. The speed-controling lever adjusts a detent to regulate the sparking.

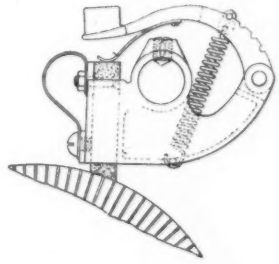
1,084,100. Automatic Fire and Burglar Alarm. L. A. Meyers, Sauk Center, Minn. For attachment to telephone circuits; a rocking bar successively breaks the circuit.

1,084,104. Magnetic Break-Switch. G. E. Palmer, assignor to Palmer Electric & Mfg. Co., Boston, Mass. A multipolar circuit-breaker with the several contacts mounted at different heights and in different vertical planes.

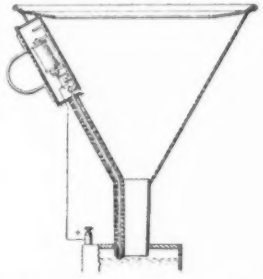
1,084,113. Headlight-Dimmer. G. G. Rosino and F. W. Thomas, Sandusky, O. Has electromagnetically shifted plates. (See cut.)



1,084,113.—Headlight Dimmer.



1,084,384.—Brush Holder.



1,084,444.—Battery-Filling Funnel.

1,084,129. Method of Softening the Ends of Electrodes and Other Carbon Articles. J. W. Brown, assignor to National Carbon Co., Cleveland, O. Consists in sending a current through the end and confining it almost entirely to the outer portion thereof.

1,084,147. Support for Electric Service-Wires. G. Hopkins, Portland, Ore.; H. M. Palmer, administrator of said Hopkins, deceased. Comprises a pair of pivoted sections and sleeve portions carried thereby and adapted to engage the cross-arm pin.

1,084,148. Device for Transmitting Force by Means of Magnetized Rings. A. Huguenin, Zurich, Switzerland. Comprises rings carried by disks, blades on the rings and an electric coil secured to one of the disks.

1,084,150. Process of Electrolytic Production of Copper. N. V. Hybinette, Christiana, Norway. Consists in circulating the electrolytic from the cathode to the anode.

1,084,155. Tracing Device for Copying or Duplicating Machines. E. R. Lochman, Boston, Mass. Includes a special circuit-making and breaking device.

1,084,189. Telephone System. F. M. Wolf and R. M. Austin, Monroe, Wis. Removal of the receiver from the hook causes intermittent opening and closing of the signaling circuit.

1,084,192. Internal-Combustion Engine Comprising Rotating Cylinders. E. Becker and F. Dinslage, assignors to Siemens & Halske, A. G., Berlin, Germany. The spark plug of each cylinder is connected to a section of a contact ring.

1,084,199. Fireproof Electrically Conducting Bodies and Process of Manufacturing the Same. G. Egly, assignor to Gebrueder Siemens & Co., Lichtenberg, Germany. Free silicon and a carbonized binder are molded into the desired form and then caused to absorb carbon and oxygen by heating in a suitable environment.

1,084,206. Attachment for Mouth-Pieces. A. C. Gaynor, assignor to L. Block, New York, N. Y. An annular disinfectant holder is clamped to a telephone mouthpiece.

1,084,220. Apparatus for the Electric Lighting of Motor Cars and for Other Purposes. M. Metz, Coventry, England. A switch for connecting the lights to part or all of the battery.

1,084,239. Telephone Attachment. W. J. Stuart, Portland, Conn. Means for holding the counterbalanced receiver to the ear.

1,084,261. Lamp Support. R. E. Ewing, assignor to Pittsburgh Lamp, Brass & Glass Co., Pittsburgh, Pa. A spring holder for supporting a lamp socket.

1,084,274. Apparatus for Graphitizing Carbon. P. L. T. Héroult, assignor to Electrode Company of America, Niagara Falls, N. Y. The material is passed through a vertical graphitizing chamber with a circular electrode at the top and bottom so as to be acted upon by the current passing between the electrodes.

1,084,277. Automatic Pressure-Switch Controller. C. S. Jennings, assignor to Lamson Co., Newark, N. J. The controller for the motor driving the blower is governed by an air-pressure piston.

1,084,304. Inhaling Device. B. C. Vaughn, assignor to S. C. Vaughn, Pittsburgh, Pa. Includes an electric heater for vaporizing the medicine.

1,084,305. Coin-Controlled Mechanism. R. Watson, assignor to G. C. Yocum, Scranton, Pa. An electromagnet releases a detent when its circuit is closed by a coin.

1,084,317 and 1,084,318. Electric Locomotive. W. Dalton, Schenectady, N. Y. The first patent relates to the new New York Central type of locomotive wherein the cab ends are swiveled on two separate eight-wheel, motor-driven trucks. The second patent relates to interlocking of the leading and trailing trucks.

1,084,328. Telephone Attachment. E. Gransaull, New York, N. Y. Attached to the receiver is an extension sound tube with trumpet convenient to the ear.

1,084,351. Apparatus for Extracting Metals from Their Ores. H. S. MacKay, assignor to MacKay Copper Process Co., Riverside, Cal. For a combined electrolytic and leaching process.

1,084,362. Lamp Support. H. C. Reagan, Philadelphia, Pa., assignor of one-half to W. R. Benson. Carries a number of tubular lamps between the upper fixed and the lower movable arms.

1,084,364. Windings for Electrical Machines. E. Rosenberg, Berlin, Germany. Has shunt and series fields so connected that the voltage is unchanged regardless of speed or direction of the machine.

1,084,365. Constant-Output Generator. E. Rosenberg. Has a series field arranged to be saturated by a fraction of full-load current, and commutator brushes so positioned as to produce with the armature windings circuits in which the current opposes the field magnetization.

1,084,375. Portable Electric Lamp. G. B. Swinehart, Seattle, Wash. The socket and reflector holder are pivoted to the upright standard.

1,084,379. Screwless Carbon-Holder. W. W. Wile, Bluffton, Ind. A compound cam clamp.

1,084,382. Circuit-Closing Device. W. W. Alexander, Denver, Colo.; E. T. Keim, administrator of said Alexander, deceased, assignor to Protective Signal Mfg. Co. The contacts are inclosed in a casing and closed by depression of the rail on its top.

1,084,384. Brush-Holder for Dynamo-Electric Machines. T. S. Allen, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis. Has an integral weight secured to the spring pressure finger to increase its inertia. (See cut, page 209.)

1,084,396. Electromagnetic Switch. E. R. Carichoff, assignor to General Electric Co. Has a shunt closing coil and a series overload coil which first opens the shunt circuit and then quickly opens the switch.

1,084,397. Ignition-Indicating Device for Internal-Combustion Engines. A. de Clairmont, Toledo, O. In a cabinet are several helical vacuum tubes electrically connected to the ignition circuit.

1,084,416. Electric Trap. J. Entwistle, Utica, N. Y. A rat trap with electrocuting contact plates.

1,084,444. Battery-Filling Funnel. C. O. Keagy, B. K. Tollinger and W. H. Beatty, Philadelphia, Pa. Secured to the outside of the funnel is a buzzer with insulated wire alongside the nozzle to signal when the battery has been filled. (See cut, page 209.)

1,084,466. Electric Furnace. G. Mettler, Berlin, Germany. Has a carbon resistance cone below a gas burner.

1,084,469. Voltage-Regulating Means. H. Nehlsen, assignor to General Electric Co. A polyphase double induction regulator connected to special voltage taps on the transformer.

1,084,503. Automatic Brake-Controlling Device. G. C. Sweet, U. S. Navy. Provides for electromagnetic shifting of the air-brake valve.

1,084,506. Electrically Operated Air Brake. H. L. Tooker, Winslow, Ariz. Includes a slide valve controlled by an electromagnet.

1,084,540. Ventilating Fan. J. M. Dayiantis, Chicago, Ill. A double-ended fan motor has a spring-held screw-driver on each guard to engage the set screw of the fan blade, and a stop-arm for stopping either blade.

1,084,542. Open-Wire-Testing Instrument. C. L. Faries, Phoneton, O. A Wheatstone bridge set for determining the relative capacities of two conductors.

1,084,543. Spark Plug. F. M. Furber, Beachmont, Mass. Relates to details of construction.

1,084,551. Inclosed Electric Arc Lamp. M. Körting, assignor to Körting & Mathiesen Aktiengesellschaft, Leutzsch, Germany. A flame arc with a cooling chamber over the combustion chamber.

1,084,556. Electrolytic Apparatus for the Clarification of Sugar Solutions. H. McCubbin, Lahaina, Hawaii. The electrodes in a closed chamber are adjusable from the outside.

1,084,560. Panelboard. R. H. Olley, assignor to Crouse-Hinds Co., Syracuse, N. Y. Provides special mounting for switch bases on the branch circuit bars.

1,084,589. Electric Meter. G. M. Willis, assignor to Chicago Electric Meter Co., Chicago, Ill. Has an adjustable magnetic shunt for the retarding magnet.

1,084,590. Electric Motor. H. L. Zabriskie, assignor to Diehl Mfg. Co., Elizabeth, N. J. An inclosed motor with controller for the sections of the field coil.

1,084,592. Apparatus for Marking Photographic Films or Plates. O. Chouinard, assignor to J. W. Berwick, New York, N. Y. Contains an electric lamp and switch therefor.

1,084,594. Induction Generator. F. E. Norton, Lynn, and F. A. Wilson, Nahant, Mass. Insulating walls between the inductors form passages whereby a stream of vapor can be passed over the collectors.

Reissue 13,675. Engine Starter. T. J. Gray, Indianapolis, Ind., assignor to Gray Engine Starter Co. Original No. 1,081,268, dated Dec. 9, 1913. An electric motor can be gear-connected to the engine.

Patents Expired.

The following United States electrical patents expired January 19, 1914.

575,322. Incandescent-Lamp Socket. R. B. Benjamin, Chicago, Ill.

575,332. Electrically Illuminated Jugglery Apparatus. M. Cronin, London, England.

575,341. Clutch for Arc Lamps. E. Finkbeiner, Brooklyn, N. Y.

575,346. Electric Railway. W. Grunow, Jr., Bridgeport, Conn.

575,354. Electric Rail-Bond. W. Jens, Johnstown, Pa.

575,366. Electrical Controller. W. H. Morgan, Alliance, O.

575,394. Magneto Telephone. S. D. Field, Stockbridge, Mass.

575,419. Telegraphy. P. B. Delany, South Orange, N. J.

575,449. Telegraph-Battery Jar. A. L. Werner, Delano, Pa.

575,454. Series-Multiple Controller for Electric Motors. E. M. Bentley, Lawrence, N. Y.

575,455. Deep-Sea Electric-Current Meter. C. L. Berger, Boston, Mass.

575,479. Electric Elevator or Hoisting Machine. R. M. Hunter, Philadelphia, Pa.

575,490. Means for Operating Electric Motors. J. F. McLaughlin, Philadelphia, Pa.

575,573. Electrical Controlling Apparatus. O. H. Pieper and A. F. Pieper, San Jose, Cal.

575,615. Electric Motor and Device for Conducting Currents Thereto. D. N. Osyor, Newark, O.

575,653. Electrical Condenser. J. C. Lee, Brookline, W. R. Westcott, Cambridge, and E. C. Robes, Medford, Mass.

575,668. Illuminant for Incandescent Lamps. A. De Lodyguine, Pittsburgh, Pa.

575,679. Magnetizing Box. C. A. Hussey, New York, N. Y.